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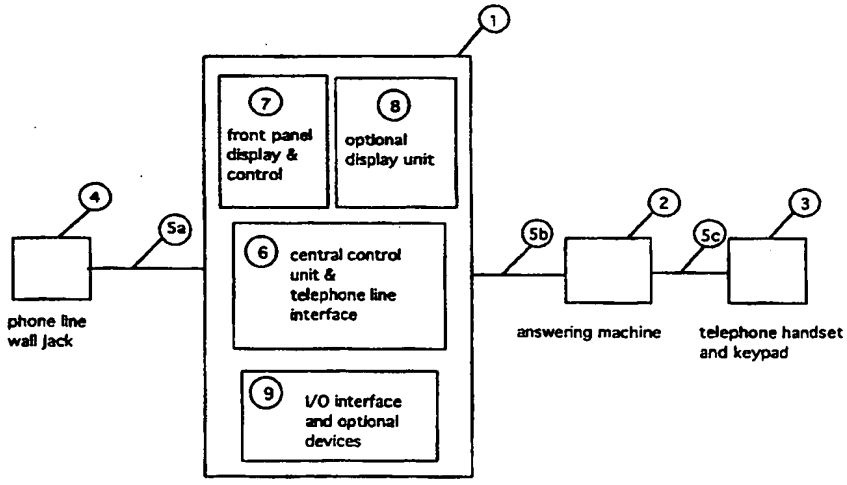


connection of E-mail apparatus and telephone & answering machine

(57) Abstract

The present invention discloses a telephonic E-mail "answering machine" (1) for receiving, processing and storing electronic messages. The E-mail answering machine (1) includes a phone jack (4) for adapting to an existing telephone line for receiving electronic messages from the phone line. The telephonic apparatus further includes a processor (6) for responding to the electronic messages and for storing the messages in the answering machine (1). In another preferred embodiment, the telephonic E-mail answering machine (1) further includes an LCD display (8) for providing information to a user relating to a reception of the electronic messages.

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# EVER READY TELEPHONIC ANSWERING-MACHINE FOR RECEIVING AND DELIVERING ELECTRONIC MESSAGES

## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention is generally related to systems for facilitating electronic messages over interconnected computer networks, and more particularly, a system for coordinating and delivering electronic mail messages directly to a novel device for sending and receiving electronic mail messages.

### Description of the Prior Art

Even with rapid increase in the use of personal computers and computer networks, the benefits of electronic communications in the forms of electronic data (or messages) representing texts, images and sounds are still limited to very small percentage of the population. To the majority of people, the information highway is still too remote. In order to get on the 'ramp' of the information highway, more sophisticate processes are required which may involve the use of computer and modem to 'log on' a local server, setting up an account, executing communications programs, sending and receiving messages, and download and upload files. To people in most households, even with a computer and a modem, these tasks are too complicate and not sufficiently 'user friendly'. Even if the technology and the systems are available, there are still many hurdles to overcome before most people can switch to an E-Mail communication mode. Ordinary people are not yet able to take advantage of the existing telephone systems and micro-processors or computers to routinely communicate with 'electronic mail' (E-Mail) for sending and receiving electronic messages.

The telephone system has been greatly enhanced and become a widely accepted communication apparatus in

households and offices since its invention. The examples include the telephone answering system found in households, the voice mail system used in office environments. The telephone answering system, including a tape recorder and some control circuits, provides a very affordable and easy-to-use telephone apparatus. It answers the incoming phone call by taking a series of steps. It performs an off-hook operation to simulate the action of human-being picking up a handset Then, it starts the communication by making an announcement and takes the message from the caller by recording the message on an audio tape. when it finishes, it hangs up and sets the incoming message indicator, such as blinking a LED. The party being called can look at the indicator and knows immediately how many messages are on the machine. To retrieve the message, all it takes is to push one button. The regular tape recorder functions, such as STOP, PLAY, FAST FORWARD and REWIND, are available to the telephone answering system. The system has been so widely accepted that many manufacturers have integrated the answering/recording functions within a telephone apparatus. The voice mail system takes a step further. It creates individual voice-mail box for everyone on the list. It allows the sharing of one telephone answering system but still keeps the privacy of the individual.

While voice communication through the telephone becomes part of our daily lives, the widely used computer has created another format of communication-data communication, One of them is electronic mail, or E-mail. The electronic mail may contain text, image and digitized voice It provides a great alternative of communication among people. Through computer network system, one person can send a mail to another person anywhere in the world as long as the addressee has a computer connected to the same network The increasing popularity of the global computer network the Internet, has made the E-mail more useful than ever.

These two important ways of communication by the

use of telephone and computer networks have worked very well in voice and data communication respectively. More sophisticate computer users are able to use computer with modem to conned with existing telephone networks to manage both data and voice communication, However, since the telephone lines can only be used on a 'dedicated' basis. Voice or data communication is totally blocked for a segment of time when that line is occupied in connecting by modem to computer networks or when two people are talking using' the phone. Because of the nature of operation, an electronic message, which has arrived at a server station, has to wait until a user logs on thus much useful time is wasted. This passive nature of E-mail delivery thus generates waste of useful resources and time when the messages are idle waiting to be retrieved.

There are some attempts to integrate a plurality of media communication in office environment Some representative examples are U.S. Pat No.5,333,266, entitled METHOD AND APPARATUS FOR MESSAGE HANDLING IN COMPUTER SYSTEMS, issued to Boaz et al. on Jul.26, 1994 and U.S. Pat No. 5,349,636, entitled INTERFACE SYSTEM AND METHOD FOR INTERCONNECTING A VOICE MESSAGE SYSTEM AND AN INTERACTIVE VOICE RESPONSE SYSTEM, issued to Irribarren on Sept.20, 1994. Both rely on a powerful computer and a local area network to integrate multiple message systems. They were designed for office use not suitable for households or small offices. Another example is U.S. Pat 5,193,110, entitled INTEGRATED SERVICES PLATFORM FOR TELEPHONE COMMUNICATION SYSTEM. It is specifically designed for use in the central office of telephone company or in a large corporate office. These inventions do not provide a solution to the difficulties that higher skill level of computer are required for E-Mail communication, Regular daily use of E-Mail communication in homes, college dormitories and small offices are still not so convenient for most people.

Popular and routine use of E-Mail communications

are still hindered by current requirements of equipment and network configurations. First, the E-mail is limited to those who have access to computers or terminal devices connected to a host computer capable of process E-mail. This may not be a problem in modem offices equipped with computers and networks for connecting to host computers or network severs. But it becomes a significant limiting factor for households and offices without the modem equipment or connecting networks. Secondly, the actual reception of the electronic messages can only be performed when the receiving computers, i.e., terminals for communication, are connected to E-mail server. The usefulness of E-mail is greatly limited in terms of timelines of the messages. In order to assure that no important messages are missed, a user has to log on to the network in a routine manner to 'check the mail' regularly. It may becomes burdensome during some inconvenient time. In order to resolve this difficulty, Clercq discloses in a U.S. Pat 5,138,653, entitled SYSTEM FOR AUTOMATIC NOTIFICATION OF THE RECEIPT OF MESSAGES IN AN ELECTRONIC MAIL SYSTEM (issued on Aug. it 1992), an E-mail system for making a call to an E-mail addressee which is triggered when a message is received. An addressee is then required to retrieve the E-mail from remote station by the use of a computer. It may even be more inconvenient than a beeper' as the addressee may not be in a convenient place with access to a computer and modem to log on to a server.

Therefore, a need still exists in the art of system design and device manufacture for electronic message communication to overcome these bottlenecks and inconveniences which limit the usefulness of the E-mail. Specifically, it is desirable to provide a telephonic E-mail apparatus which provides functions similar to a phone answering machine which is ready for a user for receiving, viewing or listening to the received electronic messages in a 'plug and play' fashion. Additionally, in order to minimize any inconvenience

thus caused to a user, it is desirable to adapt the telephonic E-mail apparatus without interfering existing telephonic communication operations. A user would thus be allowed to operate a telephone or phone answering machine with the E-mail apparatus as if no E-mail apparatus had been adapted into the system. An ordinary telephone user would then be provided with a convenient E-mail apparatus ready to be adapted into a telephone system without requiring the use of a computer and applying computer skills whereby the limitations and difficulties of the prior art can be resolved.

Moreover, as more and more people have access to computers providing for electronic mail messaging capabilities via the internet or internal networks, electronic mail messages, commonly referred to as e-mail messages, are becoming an integral part of modern communication. The delivery of an e-mail message occurs virtually instantaneously and the recipient of an e-mail message can reply to the message within minutes of the receipt.

However, for the situation where a user is connected via a phone line to the network, special problems exist. In this scenario, e-mail communication requires certain hardware and software combination in order for the user to send and receive e-mail messages. Generally speaking, for connection to the internet via a phone line to a network server, the necessary hardware includes a computer and a communication device such as a modem. Software wise, a mail program for the sending and receiving of e-mail messages is needed. Additionally, there may be a monthly subscriber charge for connect time to the server imposed by a internet service provider if the user is not connected via a prepaid network. Overall, economically speaking, it can be a significant investment to have a computer set up for the sending and receiving of e-mail messages. Moreover, the necessary hardware and software are fairly complex and may be difficult to set up by a novice user. These barriers bar majority of people from communicating

with e-mail messages.

Even if a user has a complete computer system setup for the sending and receiving of e-mail messages, there are problems with receiving the messages in a timely manner, with power consumption, and with security risks.

In order to receive e-mail messages in a timely manner, a user must either manually and periodically dial into a network server or program the computer to automatically and periodically dial into the server to check and retrieve new mail messages. The manual method is a time consuming and tedious process that distracts the user from productive use of his or her time. The automatic method requires that the computer be left on all of the time which wastes power and may incur telephone toll charges every time the computer calls the server. If the network server is programmed to call and deliver a new message to the user's computer upon receiving it, the user's computer must be left on all the time which again wastes power.

Moreover, whenever a computer is left on, there is a risk of security breach where there might be unauthorized access to the computer via either the phone line or from the keyboard by an unauthorized person and thereby compromising the user's computer system.

All in all, the above described factors prevents e-mail messages from being delivered to every household. Thus, a new e-mail system and a low cost device are needed to provide an universal e-mail messaging system capable of sending and receiving e-mail messages from and to every household.

## SUMMARY OF THE PRESENT INVENTION

It is therefore an object of the present invention to provide an apparatus and a new communication system architect and process ready for implementation on existing telephone system to overcome the aforementioned difficulties encountered in the prior art.

Specifically, it is an object of the present invention to provide an apparatus ready to adapt to an

existing telephone system in a 'plug-and-play' manner to receive and delivery electronic messages including text, images, and digitized voice signals whereby every household with a telephone can easily access to and be benefited by electronic messages without requiring more complicate processes of employing computer and modem and managing the execution of communication programs before such messages can be exchanged thereon.

Another object of the present invention is to provide a telephonic electronic message 'answering machine' which is equipped with user friendly features similar to a convention answering machine without interfering with existing telephone functions such that every regular house can apply such an apparatus immediately.

Another object of the present invention is to provide an electronic message apparatus which stores initial registration and subsequent logon information therein to automatically dial up several local servers directly, subject to user selection, to perform the initial registration and subsequent logon functions such that more complex functions of registration and logging on to a server can be managed automatically.

Another object of the present invention is to provide an electronic message apparatus which can coordinate with a server to perform message screening and message prioritizing functions such that a user can pre-arrange to receive or screen types of messages according to the importance of such messages.

Yet another object of the present invention is to provide a method and apparatus for facilitating, sending, and receiving of e-mail messages through interconnected computer networks or telephone networks.

A further object of the present invention is to provide a low cost method and apparatus for transmitting and receiving e-mail messages.

Yet another object of the present invention is to provide a low cost method and apparatus for delivering e-mail messages incurring minimum telephone toll

charges.

Briefly, in a preferred embodiment, the present invention includes a telephonic apparatus for processing electronic messages which includes a means for adapting to an existing telephone line for receiving electronic messages including digitized signals. The telephonic apparatus further includes a processing means for responding to the electronic messages and for storing the messages therein. In another preferred embodiment, the telephonic apparatus further includes an user interface means for providing information to an user relating to a reception of the electronic messages.

In another embodiment, a system for facilitating, sending and receiving e-mail messages is disclosed. This e-mail system is supported by one or more main servers and a plurality of regional servers geographically distributed in populated areas, and are interconnected via a computer network such as the internet. An incoming e-mail message under this system is first processed and packaged by the main server to allow tracking of this message. The packaged message is then sent to the designated local server via a regional server. The local server receives the e-mail message and notifies or delivers the message to a client (user) e-mail device through one of several available methods. These methods include direct mail delivery, call-back mail delivery, and notify-only. Under the notify-only method, the local server uses an optional ringing protocol to notify the e-mail device that there is a mail message waiting. Under the call-back delivery method, the local server uses the optional ringing protocol to notify the e-mail device, and the e-mail device then calls the local server to retrieve the message. Under the direct-delivery method, the local server calls the e-mail device and delivers the message. The e-mail device is a novel device designed to send and receive e-mail messages. It is a low cost device that may be a stand-alone device, a part of a multi-function device, or a part of a computer expansion card. The

servers of the present invention can be maintained and operated remotely.

An advantage of the present invention is that it provides a method and apparatus for facilitating, sending, and receiving e-mail messages through interconnected computer networks and/or telephone networks.

Another advantage of the present invention is that it provides a low cost method and apparatus for transmitting and receiving e-mail messages.

Yet another advantage of the present invention is that it provides a low cost method and apparatus for delivering e-mail messages while minimizing telephone toll charges.

These and other objects and advantages of the present invention will no doubt become obvious to those of ordinary skill in the art after having read the following detailed description of the preferred embodiments.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram showing how the present invention of the E-mail apparatus connects with the existing telephone answering system.

Fig. 2 is a block diagram of the present invention of E-mail capable telephone apparatus.

Figs. 2a, 2b, 2c, 2d are preferred embodiments of communication systems which incorporate an E-mail apparatus of the present invention.

Fig. 4 is an implementation example of a basic front control panel of the apparatus.

Fig. 5 is an example of more complicated or non-frequently used functions menu of the apparatus.

Fig. 6 is a flow diagram of the easy registration process.

Fig. 7 is a flow diagram of a typical E-mail collecting process.

Fig. 8 is a flow diagram of an E-mail receiving

process.

Fig. 9 is a flow diagram of the E-mail delivery process on the E-mail sever.

Fig. 10 is the overall network connection diagram. It shows how the E-mail ready telephone communicates with the server and the rest of the world.

Fig. 11 illustrates a conceptual representation of the internet, a number of servers connected to the internet, and a number of computers connected to each server;

Fig. 12 illustrates a conceptual representation of the e-mail system of the present invention utilizing the internet, servers, and e-mail devices;

Fig. 13 shows a hierarchial relationship between the main server, regional servers, and local servers;

Fig. 14 shows another hierarchial relationship between the main server, regional servers, and local servers where the local servers may be connected directly to the main server;

Fig. 15 illustrates the steps for registering an e-mail device;

Figs. 16a-16d show the pseudo code for the procedures residing on the main server for facilitating incoming and outgoing e-mail messages;

Figs 17a-17h show the pseudo code for the procedures residing on the local server for interacting with the main server and the e-mail device;

Fig. 18a shows a computer expansion card implementation of the e-mail device;

Fig. 18b-18c illustrate the pseudo-code for the software residing on the computer system for operating the e-mail expansion card;

Fig. 19a-19d show other computer expansion card implementations of the e-mail device used in conjunction with a fax/modem;

Fig. 20 illustrates a block diagram of the components in implementing the ringing protocol on the local server side;

Fig. 21 illustrates a block diagram of the

components in implementing the ringing protocol on the e-mail device side; and

Fig. 22 illustrates a block diagram of an integration of a faxing device and the e-mail device.

Fig. 23 illustrates a configuration for remote-controlling a server computer using the ringing protocol of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig. 1, the block diagram shows how the present invention of the E-mail apparatus connects to the telephone and the answering system. A twisted-pair of telephone line 5a connects the phone jack 4 on the wall to the "line" connector on the E-mail apparatus 1. Another telephone wire 6 connects the "phone" connector on apparatus 1 to the answering system 2. Then the answering system 2 connects to the telephone (handset and keypad) through line 5c. if there is no answering machine, line 5b connects to the telephone directly. Every incoming phone call will be taken by the E-mail apparatus first. If it is not for E-mail, it will pass the call to the answering system. It is important to maintain the same functionality of the existing telephone answering system when the apparatus is added to the telephone/answering system. It will be clear when we explain the inside of the apparatus 1. In Fig 1. it shows that the apparatus has 4 major building blocks: central control & telephone line interface unit 6, front panel display and control 7, optional display unit 8, I/O interface and other devices 9. Only the central control & telephone line interface unit 6 is needed for every apparatus. The others may have many different combinations.

Fig. 2 is the internal detailed diagram of the E-mail apparatus. Processor 11 reads the codes stored in ROM 12 and performs its duty according to the request from the user. For example, if the auto-collect is set up, processor 11 will receive an interrupt signal from interrupt controller 17. The interrupt will be serviced

by processor 11 to set up modem 23 through universal I/O bus 20 and dial the designated E-mail server to collect the E-mail. By using an universal I/O bus 20, it makes the architecture flexible to add or reduce its functions. Block 14 contains logic to interface system bus and I/O bus. Blocks 11-20 constitute the basic central control unit Blocks 21-23 belong to the telephone interface unit The basic control and display unit has blocks 25 and 26. Block 28 is the display for mail reading and block 27 is the controller for block 28. There are two displays in Fig. 2 The small display in 26 is used for control and status information. To display mail, a bigger display 28 is more suitable. If display 28 is built-in, display 26 can be eliminated. If the user relies on data export function to move E-mail files to his computer and to read the mail there, display 26 alone will be enough. Display 28 can be a LCD, monitor or a TV, and display control 27 will be a compatible controller. RAM 12 is a device used as a scratch pad for processor during the execution of the codes from ROM 12 ROM 12 can be a flash memory. Processor 11, ROM 12, RAM 13 and I/O bus controller 14 are connected to system bus 15. I/O bus controller allows the processor to communicate with all the other I/O devices. Real time dock 19 keeps track of the time. Timer 18 and interrupt controller 17 are used for program flow control. Clock and power management 16 is used to save the power consumption of the apparatus. when power consumption is not a concern, block 16 can be as simple as a dock chip. Processor 11 responds to the user request from front panel control 26 through panel interface block 25. It also uses panel interface block 25 to display other information to user. UART 22 is a serial communication block, it is used to move data between the E-mail apparatus and the external world. Through the modem and telephone line, it connects the apparatus to other communication devices. With a local Rs-232 or infra-red link, it can import/export data to/from a computer, digital organizer or printer.

Display control 27 is to display the mail on a display device 28. Some desirable devices such as secondary storage device 21, audio device 29 are optional add-ons. If a reasonable size of flash device is used as storage, block 21 will not be important Telephone interface block 24 controls the interface with telephone line, telephone answering system and modem. The details of block 14 are shown in the diagram of Fig 3.

There are many electronics devices available to implement Fig 2. Here is one example. Use the single chip platform VG-230 from Vadem (San Jose, California) for blocks 11, 15, 16-19, 20, 22, 27 in Fig. 2. This chip has processor, memory controller, I/O bus and many I/O peripheral devices integrated into a single chip. Modem (block 23) can be the single-chip modem SSI 73K321L from Silicon Systems (Tustin, California).

Figs. 2a - 2d are preferred embodiments showing some of the possible combinations of the modules. Fig. 2a uses TV as a primary display of mail. Block 28 in Fig. 2 is replaced with a television 28a. Flash memory 12a is used for codes and mail storage space. This is one of the simple implementations. Fig. 2b is suitable for people who have access to the computer. It is comprised of a floppy controller and drive. The mail is save on a floppy diskette. The user can take diskette to a computer and read mail there. Block 25 can be simplified since there is no need to control the display of mail. This is an example of how to count on data export function to reduce the configuration of the apparatus. Fig. 2c is another example of data export function except using different means of moving data is used. It uses Infra-red link o move data to/from the computer. In both cases, outgoing mail can also be imported from diskette or infra-red-link. Fig. 2d is an example with extensive functions. It contains removable flash memory card 26b using industry standard PCMCIA interface to save mail. It has a built-in LCD display 28b for reading mail. An audio device 29a will generate voice if the incoming mail contains a digitized voice

file.

Fig. 3 is the diagram showing internal block of the telephone interface function. When the system is in idle state (i.e. no incoming phone call), line switch 31 is set to telephone line 35 and interface control 34 and line 39 is open. When there is an incoming phone call, the telephone line interface control 34 will generate an off-hook to the caller and then monitor line 35 to see if it is an E-mail communication from line 38. If it is not, interface control 34 triggers a ring through the ring control 32 and lines 40, 41 and 42 to the telephone answering system. When handset/keypad interface block 33 detects off-hook signals on line 37 from the telephone answering system, line switch 31 turns the switch to line 39. Then the telephone is in control. The E-mail apparatus gives up communication to the telephone/answering system. This is a very important process for maintaining the function of telephone answering system function as if the E-mail apparatus is absent. In the case of E-mail communication, line switch 31 keeps the phone line connected to 35 all the time. Handset and keypad interface block 33 also becomes active when the keypad is used to control the E-mail apparatus or to edit an outgoing mail. The keypad information will be passed to the processor to respond.

Fig. 4 is an example to show the concept of the easy-to-use interface. Block 51 is a simple display panel. Blocks 52-57 are control buttons. Button 58 is a control button and an indicator. A blinking indicator 58 means an incoming mail is ready for retrieval. The user can push button 54 to read the mail. At every push of button 54, a full page of mail would be displayed to fit into the size of the display. Push button 55 to jump to the next mail. Button 53 is to display the previous page. Pushing button 52 to jump to the beginning of the previous mail. Pushing button 52 longer means back to.the beginning of the first mail and the mail will be overwritten when the next batch of mail arrives. Pushing button 58 will dial, send and collect mail. When it is

done, a message will be displayed on block 1 and call indicator 8 will be blinking. Button 56 is used to interrupt the E-mail communication when the user needs to use the telephone. Button 57 is a special function button. It provides more complicated or unusual functions. It brings a menu of functions for the user to select. The functions may include registration, mail forward, and mail hold request The list in Fig. 5 is an example for those functions. The concept of separating all the basic and frequently-used functions from the complicated and infrequently-used functions by different interfaces makes the E-mail apparatus a user-friendly device while maintaining some advanced functions.

Fig. 5 exemplifies a list of the menu of more complicated and infrequently-used functions. Function 1 is a guided registration process function. Function 2 is to set the current time. Function 3 is to set the programmable secret code. Function 4 is to change the number to dial other than the designated E-mail server. Function 5 is to request E-mail server to hold the mail. Function 6 is to request the forwarding of the mail. Function 7 is to set up the daily auto-dial and connect time with the E-mail server. Function 8 is for data import/export. Function 9 is to display your e-mail address. Function 10 is to request the change of E-mail address if you don't like the assigned address after registration. Function 11 is to run diagnostics on the unit By pushing button 57 in Fig. 5, the menu of functions will be on the display 51 in Fig. 4. Every push will display next function. Button 58 is used to select the function. When the function is selected, the software in apparatus will guide user through the process. If the unit has a bigger LCD display built-in, it may display all the function at once, and the user can move the courser around the menu to select the function.

Whenever the apparatus does not detect any action from the user for an extended period of time, such as 10 minutes, it aborts all the incomplete process and resets

to the idle state.

Therefore, the present invention discloses a telephonic apparatus for processing electronic messages which includes a means for adapting to an existing telephone line for receiving electronic messages. The telephonic apparatus further includes a processing means for responding to the electronic messages and for storing the messages therein. In another preferred embodiment, the telephonic apparatus further includes an user interface means for providing information to an user relating to a reception of the electronic messages.

Fig. 6 is the flow chart of a typical registration process. The user only needs to push a few buttons (step 101 in the diagram) and enter the phone number (step 103). The process will automatically take place by doing steps 104-111 and an E-mail address will be assigned and displayed (step 108). Step 111 is to search the phone number of the best E-mail server for the user to dial in based on user's phone number and save the number in the apparatus.

There are two ways to communicate between an E-mail apparatus and its server. One way is auto-connect, the other is the conventional logon process. when the E-mail apparatus initiates a call to the server, the server will try to auto-connect first It is an automatic process and requires no user attendance. The first requirement for the auto-connect is that the server knows the user's E-mail address and the machine ID of the E-mail apparatus. The second requirement is that the server and the E-mail apparatus have the same derived password. The derived password is a code generated by an equation based on the P code (programmable code), the user's phone number and the machine ID. In order to do transaction, both need to share the same equation. Checking the machine ID and the derived password, the server can determine the legitimacy of the request from the E-mail apparatus. The auto-connect provides the convenience of automatic downloading mail. But if the checking fails, the server will ask the user to enter

the password. This is the case when a different machine is used to download mail, the E-mail apparatus has a different machine ID. The server will not use auto-connect, and a conventional logon process is required to access for security reasons.

In the case of a server initiating the call to an E-mail apparatus, the auto-connect is the only way to communicate and get/give access. In other words, only the designated server can deliver mail to the designated E-mail apparatus. This is to provide security and convenience. if the user gets a new E-mail apparatus, a change of registration is required to get the auto-connect function.

The following is a detailed process of the access legitimacy checking in the auto-connect mode. First, the apparatus sends its unique serial number (i.e. machine D) to the E-mail sever. Secondly, the apparatus sends its E-mail address to the server. if these two do not match, the server will ask the user to enter the password and the conventional logon process takes place. Otherwise, the E-mail apparatus will proceed to send its programmable code or P code and the derived password to the server. The derived password is generated from the machine ID, P code and user's phone number. It is sent to the server and compared against the derived password from the server. If the server checks and finds it correct the access is authorized. The programmable code or P code to the E-mail sever is used as an instruction to screen the incoming mail and to generate a derived password.

Fig 7. is the flow diagram to show how the apparatus connects to the E-mail server, sends the outgoing mail and receives the incoming mail. It can be performed on a predetermined time daily (which starts from step 122 in the diagram) or upon the request from the user (which starts from step 121 in the diagram). Steps 127, 129 and 130 are where security and screening processes take place. Steps 134-138 are designed to

prevent the overflow of incoming mail and protect the integrity of the received mail. The details are explained later.

Fig 8. is the flow diagram of how an E-mail apparatus responds to a request from the server. whenever there is an incoming call, the apparatus will do "off-hook" (step 142) and check if it is an E-mail request (step 143). if it is not, the call will be directed to regular voice communication as steps 144-146. Otherwise, it proceeds to step 147. If the machine ID and derived password checking passes, the transaction starts. if it fails, the call is terminated. Step 148 is an option. It will inform the addressee of a potential problem on the mail delivery. The mail transfer transaction can process the outgoing mail (step 149) and check if the total mail size fits into the E-mail apparatus. if not, only parts (extracted) of the mail are delivered (step 153). Before terminating the process, the incoming mail indicator is updated (step 155).

The following is the detailed description on how the E-mail server screens the incoming mail. It includes sorting, extracting and repackaging before the delivery of the mail.

The present invention uses the extension of the E-mail address and the programmable codes or P code received from the apparatus to determine the importance of the incoming mail. The E-mail address is based on the naming convention on the Internet, called Domain Name System (DNS), with additional field. The DNS has the general format as:

<someone>@[subdomain].[subdomain].[...].<domain>

where the <...> represents required elements and [...] is optional portion. A typical example looks like: jsmith@sales.abc.com for John Smith in the sales department of ABC corporation "jsmith" is the account name for John Smith. It is assigned to him by the system administrator of the host computer. Usually, it is the logon name used to access the host computer. And abc.com

is the name of the host computer connected to the Internet network There is governing body for the host name assignment The name will be translated into 'P address and recognized by the peer on the network Hence a mail from bigbird@xyz.com can be delivered to abc.com host computer through the global network, internet. When the host computer named abc.com receives the mail, it knows its subdomain, sales. It sends the mail to the internal E-mail server in sales department of ABC corporation. When John Smith logons the computer, he will be notified of the arrival of the E-mail.

The present invention uses some extensions on top of the DNS to provide some enhancements. The new extended E-mail address for jsmith@sales.abc.com become jsmith[.<specialcodes>]@sales.abc.com. The general format becomes:

<<someone>.[specialcodes][ClassofMail]@[subdomain].[...].<dom ain>

One example looks like:jsmith.4567ER@sales.abc.com. Here "4567" is used to compare with the P code on the apparatus. The result of the comparison determines the importance of the incoming mail. An incoming mail with special codes completely matching the P code will get the highest priority. A mail with partially matched codes will gain some attention based on how close the address extension codes compare with the security code. In the above examples, "E" indicates the mail is Express mail, so it will be delivered in a more timely fashion. The "R" indicates the mail is registered. It requires a return receipt when the mail is delivered successfully. A mail without the special codes on the E-mail address will be treated by the E-mail server as a regular bulk mail.

Since the E-mail ready telephone apparatus is likely to be a small special-purpose device, the relatively limited capacity requires more careful management The P code provides a very simple way to sort the incoming mail and prevent the flooding of the junk mail. But, even with the screening feature, the unexpected volume of incoming mail may still cause mail

box overflow. The mail repackaging function on the server will prevent this from happening. It works as follows.

After the legitimacy checking, the E-mail server gets the information of available storage on the E-mail apparatus and decides what to send. If the total size of the incoming mail exceeds the available storage space on the apparatus, the E-mail server extracts the incoming mail and "repackages" the E-mail and sends it to the apparatus. The extracting process may reduce the mail size by taking the whole content of high priority mail but only the subject, name of sender from the lower priority mail. It may use a complicated method to achieve the best result from extracted mail. The protocol puts the intelligence and complexity to the E-mail server but keeps the E-mail apparatus simple. It is an important concept in the present invention.

Fig 9. is the flow diagram of how an E-mail server processes the mail. Step 166 actually is a two-step process as explained before in Fig. 7. Step 170 sending the outgoing mail and steps 171-172 checking and sorting incoming mail can be done in parallel. Different class of mail may take different steps as shown in step 163 (for express mail) and step 176 (registered mail). This flow diagram exemplifies how a mail is processed.

Fig. 10 exemplifies the overall network connection. The E-mail ready telephone 200 connects to its local E-mail server 202 through the existing telephone network 201. Usually, the local E-mail server 202 connects to the host computer 204 with a LAN (local area network) 203. A global network 205 links the host computer 204 and 206 together. The network 205 usually is a WAN (wide-area network). Computers 208,209,210 and the host computer 206 are connected by a LAN 207. A user can send an E-mail from computer 208 to an addressee of the E--mail ready telephone system 200. The E-mail will travel to the host computer 206 through the LAN 207. The host computer 206 serves as a gateway to the global network 205. The mail will be passed to the WAN 205. It may

travel through several host computers before reaching the host computer 204 which has the correct domain name of the E-mail address. Then the host computer 204 will look at the E-mail address or the sub-domain name and send the mail to Local server 202 through Local server 203. The mail will stay in the server and the process of Fig. 9 takes place. The server will deliver the mail either by dialing the addressee's phone number or by just waiting for the request from E-mail ready telephone. Those are the process flows in Figs. 7 and 8. All the communication process, including legitimacy checking, mail size checking and mail transfer, taken place between the server and the E-mail ready apparatus are through the telephone network 201. when the E-mail apparatus initiates the connection, as described in the process flow of Fig. 7, the server will check if it is the right machine before giving the mail. If the machine ID checking fails, the user has to enter the password to gain access. If the server initiates the call to the E-mail apparatus and finds the incorrect machine ID, mail won't be delivered. But the E-mail apparatus will signifies the addressee of the failed attempt In any case, the server has to request the information of the available storage space on the E-mail apparatus before sending the mail. It may be necessary for the server to determine the priority of the mail based on the p code and extract partial information for delivery. In other words, it is server's responsibility to deliver the proper size of mail to the apparatus.

## DETAILED DESCRIPTION OF A SECOND EMBODIMENT

Referring to Fig. 11, the network infrastructure (for a network such as the internet) 1014 is comprised of a number of interconnected servers 1012 communicating with each other using a common protocol (such as TCP/IP). A user may communicate to another user by using a computer 1010 that is connected to a server that has a point of presence on the network. The user may then send a mail message to another user having an

address at a computer connected to another server. Under this paradigm, computers are needed at both ends of the communication link and the costs for the computers may be quite high. Additionally, local area network (LAN) is used extensively in the corporate environment to connect the user's computer to the mail server. The LAN allow the user's computer to communicate to mail server in real time which acts like a local post office in the e-mail world. Real time communication between the user computer and the server allows e-mail messages be sent and received in a timely manner. However, LAN or any existing real time network is expensive and difficult to install for small businesses and households. In these situations, a phone line (voice or ISDN) is used for most people to communicate with the mail server from their home computers. This approach reduces the cost at the price of real time connection. Without real time communication, the communication efficiency and convenience is greatly reduced.

Referring to Fig. 12, an e-mail messaging system of the present invention utilizing the existing internet infrastructure is presented. The user can use a low cost e-mail messaging device 1018 to communicate with a mail server 1016 or another e-mail messaging device 1018. The device in accordance with one embodiment of the present invention is simply a low cost stand alone device capable of receiving a notification that one or more e-mail messages have been received at the local server 1016 waiting for retrieval. The device also is capable of identifying an incoming signal as an e-mail message signal, receives the incoming e-mail messages and stores them. Moreover, the device can provide the needed functional components for the user to compose an e-mail message and deliver the e-mail message to the local server or another e-mail device directly. The e-mail device uses minimum set of electronic components and consumes very low power when compared to the power consumption of a computer. It can be left on like an

answer machine. There are also other possible embodiments of the e-mail device.

Fig. 13 illustrates the preferred hierarchy for the e-mail messaging system. At the top level, there is a main server 1020 receiving e-mail messages from the internet network and sending e-mail messages originated from the client e-mail devices to the network. The main server may be one or more computers sharing a centralized database. The main server 1020 distributes and receives e-mail messages from a number of regional servers 1022. Each regional server 1022 is designated to serve a particular geographical area and serves one or more local servers 1024. The local servers 1024 interact with the client e-mail devices 1026 within its geographical area. The client device is designated to be a simple, low-cost electronic device suitable for home or business use, and it is further described infra.

To illustrate the message flow, the main server 1020 receives an e-mail message, identifies the e-mail address, determines the regional server 1022 for this e-mail message, and sends it to the corresponding regional server 1022. The regional server may be designated to serve a city or a greater metropolitan area involving several area codes. After it receives a message, it forwards the message to the local server. A local server is designated for each sub-region and directly serves the clients and their e-mail devices. Implementation wise, a regional server and a local server may be logically separate systems residing on the same physical machine. Each local server is equipped with the necessary hardware and software to communicate with clients' e-mail devices.

In an alternate embodiment, referring to Fig. 14, the main server 1020 may communicate directly with local servers to send and receive e-mail messages to and from the client e-mail devices.

Although the illustrated embodiments show a hierarchial structure, it is within the scope of the present invention to implement the present invention in

a distributive structure.

In order to provide direct e-mail messages to each client, each client is identified by an unique e-mail address, and must be registered with the e-mail system in order for the e-mail system to interact with the e-mail device. Typically, the e-mail device is accessed via a local telephone line such as a voice, data or ISDN line.

Fig. 15 illustrates the steps for the registration process where an e-mail device (as operated by the client) dials a toll-free number, logs on the main server, and the main server performs the illustrated steps. First, the main server requests and obtains the machine identification number unique to the particular e-mail device. The machine identification number identifies the device type and also provides for theft prevention. Secondly, the main server gets the security code (password) entered by the user. The use of a security code minimizes the possibility that the mail messages being delivered or received by the wrong party. Next, the main server fetches the notification code from the e-mail device. The notification code is an optional ringing protocol used by the main server to provide a notice to the e-mail device through the use of ring tones without incurring telephone toll charges.

The phone number for connecting to the e-mail device is provided to the main server. For the given phone number, the main server finds the corresponding local server and its phone number, and sends this phone number to the e-mail device. The e-mail device stores it in its memory for future use. Finally, the main server completes the registration process by completing and inserting a new client information entry into the centralized database.

**Main Server**

To track information on the clients, the local servers, and the regional servers, two tables are maintained by the main server. In table one, each

client's name, phone number, e-mail address, the local server for the client, and other administrative or accounting information are kept.

TABLE 1

| Client Name | E-Mail Addr | Local Server | Phone Number | Other Info. |
|---|---|---|---|---|
| John Smith | jsmith | 1 | (210) 231-1234 | |
| Bob Clinton | bclinton | 1 | (210) 231-7890 | |
| Al Goodman | agoodman | 2 | (123) 789-1234 | |
| Mike White | mwhite | 2 | (123) 789-4321 | |

Table two contains information for each local server, information such as the address of the regional server for the local server and the type of connection from the main server to the regional server.

TABLE 2

| Local Server | Regional Server Address (e-mail) | Connection Type |
|---|---|---|
| 1 | system@region1.com | Internet |
| 2 | postmaster@region2.com | (210) 111-1234 (leased line) |

For example, there are two local servers illustrated in table two. The regional server for local server one is connected to the main server via the internet, and the regional server for local server two is connected to the main server via a leased line for high speed communication. Other types of connection methods between the regional servers and the main server can be utilized as well (e.g. satellite) if they are economically feasible. Additional tables can be created and maintained as needed.

For the purpose of organizing incoming e-mail messages, a mailbox is dedicated to each client and maintained by the main server. The mailbox can be a file or any other type of indexable storage system.

Referring to Fig. 16a, the main server is

instructed to check for and process incoming and outgoing mail messages every x minutes where x is a defined period of time which can be a function of the load on the system.

Referring to Fig. 16b, the steps for processing outgoing mail messages are illustrated. Outgoing mail messages come from clients of the e-mail system for delivery to other users on the net. This process is performed every so often to ensure mail is processed in a timely manner. If there is a new mailbag from a local server, the new mailbag is decompressed, and the mail messages are extracted from the mailbag and passed to the send mail utility. The send mail utility can be a common mail program (e.g. Unix Operating System sendmail utilities) with the capability of sending and receiving e-mail messages.

Fig. 16c illustrates the steps for processing incoming mail messages where a mailbag is prepared for each local server. The local servers are indexed consecutively starting with index equals one 1030. For each local server, a new mailbag is initialized 1032. For each client serviced by the particular local server, the client's mailbox is searched, and new messages are extracted and appended to the mailbag for the particular local server 1034. The new mail messages are then deleted from the mailbox for the client 1034.

If the mailbag is not empty, the mailbag is compressed, and a confirm flag is set 1038. If the size of the mailbag after compression is greater than the maximum size allowed for mail delivery, the mailbag is split into two or more smaller mailbags. A copy of the mailbag(s) is then stored in a To-Be-Confirmed directory for later confirmation, and the mailbag(s) is sent to the regional server for the particular local server.

After all of the mailboxes for a particular local server have been processed, the process repeats until all of the local servers' mailbags have been processed.

The main server also performs a confirmation process to ensure that the mailbags and the individual

mail messages have been received. Referring to Fig. 16d, the steps for the confirmation process is illustrated. Every so many minutes, the confirmation process is executed. For each confirm flag that is set (confirm [i]=true), the main server searches for a confirmation message from the corresponding local server. If a confirmation message is found and not all the mail messages have been delivered and the elapsed time is greater than the maximum allowed elapsed time, the undelivered mail message is placed in an undelivered mail directory and the operator is notified. If the confirmation message is not found and the elapsed time has exceeded a maximum allowed elapse time, the operator is notified. If all the mail messages are confirmed as successfully delivered, the mail bag is placed into archive.

**Regional Server**

The function of the regional server is to serve as an intermediary between the main server and the local servers. The regional server is configured to have the function of an ISP Point-of-Presence (like an internet service provider) in order to receive and send mail via the internet. It maintains a shell account and a mailbox for each of the local server it serves. The regional server interacts with its local servers to facilitate the handling of incoming and outgoing mailbags. The mail utilities commonly available with the operating system (e.g. Unix) of the regional server can be utilized to achieve the tasks described.

The regional server can be configured to operate as a local server as well.

**Local Server**

Each local server maintains a table of clients. For each client, referring to Table 3, the client's name, e-mail address, phone number, notification type, ringing protocol, security code, machine ID, and other miscellaneous information are kept.

TABLE 3

| Name | E-Mail Address | Phone Number | Notification Type | Ringing Code | Security Code | Machine ID |
|---|---|---|---|---|---|---|
| John Smith | jsmith | (210) 231-1234 | notify-only | 0.5/ 0.25 | 123 | 789 |
| Bob Clinton | bclinton | (210) 231-7890 | call-back | 0.3/ 0.5 | 456 | 111 |

There are three notification/delivery types: notify-only, call-back mail delivery, and direct mail delivery. In the notify-only notification method, the local server calls the client's e-mail device using the specified ringing protocol from the table. No connection is actually made between the local server and the e-mail device. The rings are set up in such a manner that the e-mail device is programmed to recognize the ring pattern and determine that a notification is being delivered by the local server. When the notification is successfully received, the e-mail device activates an indicator light on the e-mail device. The client/user can then retrieve the message at his or her convenience using the e-mail device or other means. If in the process of notifying the e-mail device, an actual connection is made, the e-mail device can be set to call the local server to retrieve the e-mail messages or messages can be directly delivered.

In the call-back mail delivery method, similar to the notify-only method, the ringing protocol is used to notify the client's e-mail device that there is one or more e-mail messages waiting at the local server. The notification causes the e-mail device to call the local server and retrieve the e-mail messages.

In the direct mail delivery method, the local server calls the e-mail device, connects with the e-mail device, and delivers the e-mail messages to the e-mail device. The client may designate any one of the three notification methods as long as it is supported by the

e-mail device and the local server.

The optional ringing protocol is a method for the local server to provide notice to the e-mail device without incurring toll charges. It utilizes and controls the length of ring time and the length of time between rings. Using this method, a calling device (here the local server) dials the number, detects ring tone for x1 second(s), hangs up, waits for w1 second(s), dials the number again, detects ring tone for x2 second(s), and hangs up. The receiving device (here the e-mail device) upon detecting this particular ringing protocol determines that a notice is being delivered by a calling device, and accordingly executes a preprogrammed routine (if any). The ringing procedure of dial, detect, hang up, and wait is not limited by a specific number of iterations and may be repeated a number of times. In the preferred embodiment, this procedure is repeated three times, using x1, x2, x3 and w1, w2. The method may be simplified by setting w1 and w2 to have the same length of time. Other combinations are possible as well as long as the e-mail device is configured to detect and recognize the designated ringing protocol. In the preferred embodiment of the present invention, a ringing code, n/m, is used for each client where x1 is a constant, x2 equals x1+n, and x3 equals x1+n+m. Referring to Table 3, for client John Smith, a ringing code of 0.5/0.25 refers to x2 being x1+0.5 second and x3 being x1+0.5+0.25 second, where w1 and x1 are constants. Similarly, the ringing code for Bob Clinton is 0.3/0.5 which refers to x2 being x1+0.3, and x3 being x1+0.3+0.5, and w1 and x1 again being constants. Generally speaking, the ringing tone should not be very long. Note that generally speaking it is more reliable to use the difference between ring tones rather than timing the duration of each ring tone.

In utilizing the ringing protocol with communication switching devices in a central office where a switching device passes back a signal informing the calling device that the switching device is dialing

and ringing the line, once the calling device receives such a signal, the calling device can determine the length of ring time and hang up accordingly. Other implementation of the above described method can be applied to other types of calling devices and/or switching devices as well.

A security code (client password) may be set by the client to provide additional security measures. In order to protect the e-mail device itself from theft (as well as the e-mail messages) a machine identification number (serial number) particular to each machine is used. Thus, if the e-mail device is ill-gotten by another, it will not work. The machine ID also allows the local server to identify the e-mail device machine type.

In facilitating mail delivery, the local server interacts with the regional server/main server and clients' e-mail devices.

In interacting with the regional server, referring to Fig. 17a, the local server checks for one or more new mailbags from the regional server every x minutes. If a new mailbag is found, the mailbag is decompressed, mail messages are extracted from the mailbag and placed into the mailbox for the particular client.

Referring to Fig. 17b, every so often each client's mailbox is checked to see if there are any e-mail messages need to be delivered. If the mailbox for the particular client is not empty, the e-mail message(s) in the mailbox is delivered via the designated delivery/notification method for the particular client, i.e., one of the available delivery/notification methods. For each of the delivery/notification methods, there is a corresponding procedure call.

For the notify-only method, referring to Fig. 17c, the last time the local server interacted with the client's e-mail device (logon time) is fetched. If no new mail has arrived since the last logon time, the process ends. If there is one or more new e-mail messages and no notification has been sent to clients'

e-mail devices yet, the ringing protocol described above is applied. First the local server calls the client's e-mail device. If the client's phone line is busy, the local server waits a few minutes before attempting to call the e-mail device again. If the phone line is not busy, the local server, through its interfacing hardware, detects the ring tone for x1 period of time and hangs up, wait w1 period of time, and calls the e-mail device again. If the line is busy, the process starts over after waiting a certain period of time. Otherwise, the local server detects ring tone for x2 period of time and disconnects. The local server calls a third time, rings for x3 period of time and hangs up. This completes the notification process.

For the call-back mail delivery method, referring to Fig. 17d, the above described notification process is used, and the local server sets the hardware communication device in auto answer mode. If the client's e-mail device calls back before the end of a specified time period, a handshaking process is executed to verify the security code and the machine code. Then, any outgoing mail messages is retrieved from the e-mail device and any incoming mail is delivered to the e-mail device. When the file exchange process is completed, the line is disconnected, a confirmation signal on the successful delivery of the e-mail messages is sent to the main server via the regional server, and any outgoing mail messages is sent to the main server via the regional server as well. If the e-mail device does not call back after a set period of time and if the try-counter (that keeps count the number of tries) exceeds a maximum try value for the delivery of the messages, it is deemed that mail delivery has failed and an error messages is generated and sent to the regional server to forward to the main server. Otherwise, the try-counter is incremented and the program flow starts from label 2 again to repeat the process.

For the direct mail delivery method, referring to Fig. 17e, a try-counter is initialized and the local

server calls the client's e-mail device. If the e-mail device fails to respond, the try-counter is incremented; and if the try-counter is greater than a maximum try-counter value, an error is deemed to have occurred and an error message is generated and sent to the server. Otherwise, the process is repeated by branching off to label 3. If the e-mail device responds, the process for handshaking, exchanging of any outgoing and any incoming e-mail messages, sending of a confirmation signal, and sending of any outgoing mailbag as above described for the call-back mail delivery process is executed.

In the handshaking process, referring to Fig. 17f, the security code is first verified. If the security code is incorrect, the handshaking process stops and down stream procedures are not executed. This condition is reported to the regional server and the main server for special handling. The machine ID verification process of the e-mail device is similar to the security code verification process.

In the exchange-mail-files process, referring to Fig. 17g, the local server connects to the e-mail device and retrieves any outgoing mail from the e-mail device. Next, the amount of available storage in the e-mail device is determined. If the size of the incoming mail messages is greater than the available storage size, the incoming mail messages are repackaged. The repackaged incoming mail is then sent to the e-mail device, and the process ends. In repackaging the incoming mail messages, referring to Fig. 17h, the incoming mail messages are sorted in order of priority where priority is determined by factors such as the priority code of the message and the date and time stamp of the message. The ordered messages are then selected in order of priority up to the available storage space but leaving space for a system e-mail message to the client that there are additional messages waiting for retrieval or delivery.

A priority code of the present invention can be included as part of the e-mail address itself by

comparing a number in the e-mail address itself to the security code. For example, for jsmith@emailsys.com having a security code of "124", an e-mail address such as "jsmith_123@emailsys.com" would have a higher priority than an e-mail address such as "jsmith_456@emailsys.com" because the number "123" is closer to the security code of "124" than the number "456" is to "124". Thus, by having a single e-mail address, the owner of the e-mail address can give out e-mail addresses with different priority codes.

**Client E-Mail Device - Software**

The client's e-mail device has both a hardware component as well as a software component. The e-mail device can communicate with the local server, regional server, main server, or another e-mail device (for peer-to-peer communication).

Referring to Appendix A, the software pseudo-code for the client's e-mail device is illustrated. When the device is first turned on, a power-on self-test is executed. If there is a fatal failure, the program flow branches to the Fatal_Error_Stop label, sets the fatal error indicator, and halts the system. If a minor failure occurred, the program flow branches to the Warning_Code label, sets a warning code indicator and resumes the program flow. Next, the phone line status is checked. If it is busy, the device will wait until the line is not busy. The e-mail device is then placed in auto-answer mode and the registers for the device are initialized for operation. If there is any failure during this initialization process, a warning code is posted. After the initialization process, the software continuously loops to check for an interrupt from the interrupt registers. If an interrupt is found, the program branches to the Interrupt_Service routine. The Interrupt_Service routine reads the interrupt register, determines the interrupt type, and branches to the corresponding interrupt routine.

An interrupt may be caused by one of the several

subsystems, where the types of interrupts include registration request interrupt, call-back mail delivery interrupt, dial server interrupt (which calls the same procedure as that of the call-back mail delivery interrupt), incoming mail delivery interrupt, and transfer-abort interrupt.

If the call-back interrupt flag is set, the call-server routine is executed where the communication module is set to dial the local server phone number and execute an In_Mail routine.

The In-Mail routine first performs handshaking with the local server communication module. It then sends out any outgoing mail messages prepared by the client, and requests and receives a confirmation signal from the local server. If the confirmation signal from the local server is incorrect, the outgoing mail messages are sent again by branching the program flow to label SendM. Otherwise, the device is instructed to receive incoming mail messages. If the incoming mail messages are not received correctly, a confirmation signal is generated to sent to the local server which would cause the local server to deliver the mail messages again. When the messages are correctly received, the mail indicator is set.

In the handshaking routine, the device receives the security code from the local server, verifies the code, and branches to the Bye routine if it is incorrect. Similarly, the device receives the machine ID, verifies the ID, and goes to the Bye routine if it is incorrect. The device then sends the security code and the available storage size to the local server.

Back to the Interrupt_Service routine, if the Incoming_Mail interrupt flag is set, the program flow branches to the In_Mail routine as described above.

If the Registration_Request interrupt flag is set, this flag indicates that the client has placed the device in registration mode in order to register with the main server. This process is generally executed when the device is being set up for the first time or

when the device has been moved to a new location. The program flow branches to the Registration_Request routine, where the device dials a designated phone number for registration. Generally, this is a 800 toll free number connected to the main server. When connected, the device delivers the machine ID, the security code, and the client's phone number to the main server. The main server determines the particular local server for serving the client's e-mail device based upon the given phone number. The phone number for the particular local server is sent to the client device, and the client device retains the number in memory for later use.

The dial_server interrupt flag is set by the client to send and retrieve mail messages. Like the call_back interrupt, it calls the call_server routine.

In the case where the local server is using the direct mail delivery method, the Incoming-mail flag is set and the In_Mail routine is executed as described above.

In the case where a request has been made to disconnect the line, the Transfer-Abort flag is set which causes any phone connection to be disconnected.

In the case where the hardware for the e-mail device is part of another computer system (e.g. personal computer system) in the form of an expansion card or a part of an expansion card, the interface with the e-mail device can be integrated with a mail program of the computer.

**Client E-Mail Device - Hardware**

The hardware component of the e-mail device may be embodied in several different manners. In one form, the e-mail device is a low-cost stand alone device directly connected to the phone line before the phone line is connected to other devices (e.g. answering machine, fax machine, etc.). The stand-alone embodiment interacts with the e-mail system as described above. More particularly, the software for the e-mail device as

described above is configured and stored in the ROM of the e-mail device.

In another hardware embodiment, the e-mail device is an integral part of a computer expansion card having power supplied from two sources, the computer system itself or an external power supply. Referring to Fig. 18a, an expansion card 1050 having an edge connector 1052 is illustrated. The expansion card is insertable into an edge connector slot connected to the bus of a computer system. The expansion card includes a CPU 1054 (or microcontroller) directly polling an I/O register 1056 that is communicatively connected to a notification module 1058. The I/O register 1056 receives information from the notification module 1058 and the user input and control device 1057 (which can be a keyboard, a keypad, dip switches, etc.) for entering security code, e-mail messages, or other inputs, and generates signals for indicators 1059 to indicate the status of any messages and the e-mail device. The notification module sends and receives information via a phone line connection and interacts with the communication module 1062. When the expansion card is inserted into the computer system, a bus controller 1064 controls the data flow to and from the computer system (not shown) via the edge connectors 1052. Information is passed between the flash memory 1066, the ROM 1068, the RAM 1070, the CPU 1054, and the communication module 1062 through an internal bus 1072. The communication module can be a fax/modem chipset. The expansion card 50 may be powered by one of two sources, power from the computer system via trace 1074 or power from an external source via trace 1076 and power jack 1078. The power switching and conversion module 1080 detects power from one of the two sources, performs any power conversion from one voltage level to another voltage level if it is needed, and routes the power to the components on the expansion card 1050. The power detection and switching is automatically performed without interruption to the operation of the e-mail device. Thus, no interruption of operation would occur

if power is switched in the midst of sending or receiving e-mail messages.

In this embodiment, when the computer system is on, the expansion card may be controlled and operated by the software of the computer system. When the computer system is off, unattended, or not controlled by the software of the computer system, the expansion card obtains its power supply from an external source and operates in accordance with the software described above.

Mailing program on the computer system having the e-mail expansion card would have software routes for sending and retrieving e-mail messages between the computer system and the e-mail expansion card. Referring to Fig. 18b, the pseudo-code for the computer system to retrieve e-mail messages from the expansion card is illustrated. The status of the card is first verified. If the card is not busy, the in-mail message flag (indicating the existence of new e-mail messages) is checked. If there is a new message, the message is transferred to the computer system and the storage area is cleared. Then, the message is displayed on the computer screen of the computer system. Referring to Fig. 18c, the pseudo-code for the computer system to transfer prepared e-mail messages to the expansion card for outbound is illustrated. If the card status is not busy and if there is enough storage space to store all of the e-mail messages, the e-mail messages are transferred to the expansion card and the computer can be turned off. If the storage on the card is insufficient, the user is informed to wait until the messages are sent before turning the computer off.

In yet another hardware embodiment, referring to Fig. 19a, the communication module of Fig. 18a is a commonly available external fax/modem. For an external modem, its serial port 1086 may be connected to the serial port of the computer system. The expansion card 1082 (now without the communication module) communicates with the modem 1084 through serial port 1086. The

notification device may be connected to the modem via standard phone jacks and a phone line 1088. In this embodiment, the cost of the expansion board now without the communication module is reduced. A phone line signal would come in on jack 1090 and be processed in the same manner as described above.

Fig. 19b illustrates the embodiment for an internal modem where the e-mail expansion card 1082 is mounted on the mother board 1083 and has a phone jack 1092 for receiving the phone line and phone signal and a phone jack 1093 for passing the phone signal to the modem card 1094 via phone line 1097. The modem card 1094 is mounted on the mother board 1083 as well and receives the phone signal at phone jack 1095 and passes the phone signal out at phone jack 1096. The e-mail expansion card directly communicates with the modem card via ribbon 1098. Ribbon 1098 on one end is communicatively attached to the expansion card 1082 and on the other end it can be a ribbon cable inserted into a bus connector slot 1105 of the mother board along with the modem card. Fig. 19c shows that the ribbon cable 1098 at the end having three contact surfaces 1099, 1101, and 1103. Contact surface 1103 makes electrical contacts with selected tabs on one side 1107 of the edge connector of the modem card 1094 and selected tabs on one side of the bus slot 1105. Contact surface 1101 makes physical contact (but no electrical contact) with the bottom of the bus connector slot 1105. Contact surface 1099 makes electrical contact with selected tabs on the other side of the edge connector of the modem card 1094 and selected tabs on one side of the bus slot 1105. In this manner, the modem card can communicate with the computer system and the e-mail expansion card, and the e-mail expansion card is allowed a greater amount of direct control over the modem card. In the case where power is being supplied by an external source, the power can be supplied to the modem card through certain of the selected tabs.

Note that in both Figs. 19a and 19b, the e-mail

expansion card optionally can have complete control over the external or internal fax/modem where all communication between the CPU and the fax/modem has to pass through the e-mail expansion card. In another word, the e-mail expansion card can encapsulate the fax/modem. In Fig. 19b, encapsulating can be achieved by providing a ribbon cable having printed traces on one side and non-conductive material on the other side. The modem card nevertheless is inserted into the bus slot but it does not communicate through the traces in the bus slot. Conventional methods can be applied as well where the e-mail expansion card and the internal modem card are connected via simple ribbon and connectors on each card.

In yet another embodiment of the invention, referring to Fig. 19d, the e-mail device 1130 is a stand-alone card having an slot connector 1144 able to receive a regular fax/modem card 1132. The e-mail device has a connector 1138 for receiving ac or dc power supply, a communication port 1136 (such as a serial port), and a phone jack for receiving a phone line 1134 and also a jack for passing a phone signal to another device 1135. Likewise, the fax/modem card 1132 has a jack for receiving a phone signal 1142 and a jack for passing through a phone signal 1143. This embodiment can be placed in a physical box.

Further note that although the e-mail device is illustrated as an expansion card it can be easily converted into an external device like that of the common external fax/modem device. Moreover, the expansion card can be converted to a stand alone device with a display. Moreover, communication devices are not limited to the fax/modem devices illustrated above. ISDN devices, cable modem, wireless modem, or other communication devices can be used as communication devices as well.

The hardware embodiment for implementing the ringing protocol described above requires a tone detection circuit. Referring to Fig. 20, on the local

server side, the local server provides the dialing and answering functionalities 1052 through the use of a modem 1057 or other communication devices or modules. The modem controls the phone line 1055 to dial the telephone number of the client's e-mail device, and the tone detection circuit 1053 detects the ringing tone and reports it to the local server 1056. The local server determines the length of ringing time and instructs the modem to disconnect when the predetermined period of time has been reached.

On the client e-mail device end, the notification device 1054 detects the ringing signal, the time lapsed for each ringing signal and the time lapsed between the signals. It then determines whether a valid notification code has been received. Referring to Fig. 21, on the client side, the microcontroller 1058 operates a ringing signal detection circuit 1049 and a modem 1047 in detecting whether a valid ringing code has been received.

**Integration of the E-Mail Device**

The above described e-mail device may be integrated into other devices. For example, the e-mail device may be part of a phone, a fax machine, an answering machine, etc. If the e-mail device is integrated with a fax machine, e-mail messages can be readily printed out and any outgoing mail messages may be composed through the use of the numeric keypad. Fig. 22 illustrates one embodiment of the e-mail device integrated with a fax machine. In this embodiment, there is a transmitter subsystem 1100, a receiver subsystem 1102, and a modem 1104 that can be connected to a telephone line 1106. The modem incorporates a control module 1125 to execute the ringing protocol described above and distinguishes a fax/modem signal from an e-mail message signal (or protocol) to activate the corresponding portion of the circuitries.

The transmitter 1100 can process two signals, one signal for faxing and one signal for mailing messages.

For faxing a document, the document is first scanned by a scanner 1108 and the scanned signal is converted to a digital format 1110. For mailing messages, the prepared mail messages are stored in memory 1114 and converted to raster graphic image 1126. Note that a number of methods are available for composing mail messages, including the use of a keyboard, a keypad, etc. The composed messages are then stored in memory. A multiplexer 1116 selects one of the two signals to pass through to the compressor 1112 and then to the modem 1104 for transmission in accordance with the selected mode.

The receiver subsystem 1102 processes incoming fax signal or mail message signal. For a fax signal; the signal is decompressed 1118 and sent to the printing subsystem 1122 through a multiplexer 1120. For an e-mail message signal, the signal is received and processed by an integrated e-mail device (and software) 1124 as described above. The output from the e-mail device is converted to image format 1126 and sent to the printing subsystem 1122 via the multiplexer 1120. Again, the multiplexer selects the signal to be sent to the printing subsystem in accordance with the selected mode.

**REMOTE CONTROL OF THE SERVERS**

The servers can be remotely operated and control by using commercially available communication software or tailored software. The ringing protocol may be used to set and reset the servers. Appendix B illustrates one set of pseudo-code for remote controlling the servers. Referring to Fig. 23, the server computer 1210 is connected to the network 1200 via a direct connection 1214 and through a modem 1212. The modem provides a remote login path to the server in order to control or maintain the server. If the server does not respond to the remote login, the ringing protocol of the present invention embodied in the notification device 1205 can be used to detect ringing pattern. Upon receiving a

proper ringing pattern, the notification device sends a signal to the server computer via line 1207 to prepare for shut-down and a signal to the power control module 1206 to generate a pulse to toggle the relay 1202 for a proper period of time to reboot the computer.

The software described herein for implementation of the e-mail system can be written specifically for this particular application in the programming language of choice. It can also be implemented through the use of existing system mail utility programs. For example, under the Unix system, an entire set of mail utility programs are available for the sending and receiving of mail messages.

Although the present invention has been described in terms of the presently preferred and second embodiments, it is to be understood that such disclosure including combinations of the two embodiments is not to be interpreted as limiting. Various alterations and modifications including the various combinations of the two embodiments will no doubt become apparent to those skilled in the art after reading the above disclosure. Accordingly, it is intended that the appended claims be interpreted as covering all alterations and modifications as fall within the true spirit and scope of the invention.

APPENDIX A

```
Client software codes on communication card or on a
stand alone system
Kernel
     POST (Power on self-test)
     If fatal failure, go to Fatal_Error_Stop
     If minor failure, go to Warning_code
     Check line status; if busy, wait until line is not
busy;
     Set up communication module in auto-answer mode
     Set up other I/O registers, devices
     If any failure, go to Warning_code
loop Polling interrupt
     If interrupt found, jump to Interrupt_service
     go to loop

Fatal_Error_Stop:
     set error indicator or display
     Holt

Warning_code: (input: warning code)
     set warning indicator (or display)
     return

Interrupt_Service:
     Read interrupt register
     Check the interrupt type

     case of:
          Call_back:  jump to Call_server
          Registration request:  jump to Reg_req
          Incoming_mail:  jump to In_mail
          Dial_server:  jump to Call_server
          Transfer_abort:  jump to Tfr_abort
     end case:

     Clear the interrupt that has been serviced
     return

Call_server:
     set up communication module to dial
     read_server_number
     dial (phone)
     In_mail;
     return

Bye:
     hangup
     set up communication module in auto answer mode
     return

In_mail:
          Handshaking
sendM     send outgoing mail
          receive transfer confirm info.
          If confirmation info not correct, go to sendM
to retry
          send available storage size
revM      receive incoming mail
          send receive confirmation info
```

```
            If confirmation info is not correct go to revM
            set Mail_in indicator
            return

      Handshaking:
            check the security code, if not correct, go to Bye
            receive machine ID from server (if it is used)
            check the machine ID, if not correct, go to Bye
            return

      Reg_req:
            dial the (800) number
            establish connection
            display greeting
            send machine ID
            send security codes
            echo the security code
            print "enter your phone number"
            read phone_number
            send phone number
            receive and save local server number(s)
            print "registration done"
            return

      Tfr_abort:
            save all data for immediate disconnection
            hangup
            return
```

APPENDIX B

```
Remote monitor and control of the local server

{ Codes for every local server }

Program diag_report;
begin
     Do the following every hour
          begin
          run_diagnostics_and log results
          check any problem
          mail the report to the main server
          end
end

{ Codes on main server }


Program remote_monitor;
begin
Do the following for every hour
     begin
     get_new_mail:  //the mail are diag report from
local server
     if there is mail
          begin
          check the report from each local server
          if there is a problem
               begin
               remote_dia_contrl:  //reference point
               rlogin local server //remote login & run
diag.
               if rlogin fail goto cold_boot
               run more extensive diagnostics
               if the problem is correctable correct the
program
               else reboot   //(software warmboot)
                    begin
                    wait for reboot;
                    rlgoin local server
                    if rlogin fail goto cold_boot
                    if system is okay, exit
                    else
                         begin
cold_boot:               remote_shutdown_process (n,m);
                         //hardware cold boot
                         // n,m are the secret code like
                         notification device
                         wait for reboot
                         rlgin local server
                         if system is okay, exit
                         else report problem to operator
                         end
                    end

          else
          if it is too long for not receiving mail
               begin
               rlogin the local server
```

```
                go to remote_dia_contrl
                end
        end
end

{    The remote shutdown process uses a method similar
to the notification device, but it requires much higher
security in order to prevent unauthorized shutdown.  So,
the following procedure uses two codes instead of one
code.  Again the code represents the ring tone length
difference for two consecutive dialings.  The first code
n is for the difference between the ringing period of
the first call x1 and the second call x2, and m is for
the difference between x2 and the ringing period of the
third call x3.  Typically, n and m are small numbers
which can be positive or negative numbers.  More codes
can be used to achieve even greater security.}

process remote_shutdown_process (n,m);
begin
     start_point;    //just a reference point
     call (phone_number)
          if line busy, wait and go to start_point
     detect_ring_tone for x1 second
     disconnect;
     wait w1 seconds;
     call (phone_number);
          if line busy, wait and go to start_point
     detect_ring_tone for x2 second      //x2=x1+n
     disconnect
     wait w1 seconds;
     call (phone_number);
          if line busy, wait and go to start_point
     detect_ring_tone for x3 seconds     //x3=x2+m
     disconnect;

end
```

## CLAIMS

I claim:

1. A telephonic electronic message apparatus for automatically receiving electronic messages comprising:

a means for adapting to an existing telephone line for receiving said electronic messages; and

a processing means for automatically responding to said electronic messages and for storing said messages therein whereby said electronic messages may be received and stored without requiring a human operation.

2. The telephonic apparatus of claim 1 further comprising:

an user interface means for providing information to an user relating to a reception of said electronic messages.

3. The telephonic apparatus of claim 2 further comprising:

a telephone adapting means for connecting to a telephone;

said processing means further including a telephone interface means for detecting an incoming signal received from said telephone line and for determining if said incoming signal being an electronic message and for transmitting said incoming signal to said telephone when said incoming signal being detected is determined not an electronic message.

4. The telephonic apparatus of claim 2 wherein:

said user interface means further including a display means for displaying a message relating to the reception of said electronic messages.

5. The telephonic apparatus of claim 2 wherein:

said processing means further including a message storage means for storing said electronic messages therein.

6. The telephonic apparatus of claim 3 further comprising:

an electronic message exporting means for delivering said electronic messages via a transmitting means to a receiving device.

7. The telephonic apparatus of claim 6 wherein:

said electronic message exporting means including a television interface means for delivering said electronic messages via said transmitting means to a television for displaying said electronic messages thereon.

8. The telephonic apparatus of claim 7 wherein:

said user interface means further including an message exporting control means for controlling a display of said electronic message on said television.

9. The telephonic apparatus of claim 3 further comprising:

an automatic registration means for storing required registration data therein and for automatically dialing and registrating with a network server for receiving said electronic messages therefrom.

10. The telephonic apparatus of claim 3 further comprising:

a removable data storage means for storing said electronic messages therein for removably transferring said electronic messages therefrom.

11. The telephonic apparatus of claim 5 further comprising:

a message full means for terminating a reception of said electronic messages when said message storage means reaching a full storage capacity.

12. The telephonic apparatus of claim 3 further comprising:

a message screen means for detecting designated message identifications in said electronic messages for receiving and storing said electronic messages with said designated message identifications.

13. The telephonic apparatus of claim 3 further comprising:
an automatic logon means for automatically dialing and logging on a network server periodically for receiving said electronic messages therefrom.

14. The telephone apparatus of claim 4 wherein:
said user interface means further including a display control means including control buttons for controlling the display of different electronic messages.

15. A telephonic electronic message apparatus for automatically receiving electronic messages comprising:
a means for adapting to an existing telephone line for receiving electronic messages including digitized signals therefrom;
a processing means for automatically responding to said electronic messages wherein said processing means further including a message storage means for storing said electronic messages therein;
an user interface means including a display means for displaying information to an user relating to a reception of said electronic messages, said user interface control means further including a display control means including control buttons for controlling the display of different electronic messages;
a telephone adapting means for connecting to a telephone;
said processing means further including a telephone interface means for detecting an incoming signal received from said telephone line and for determining if said incoming signal being an electronic message and for transmitting said incoming signal to said telephone when

said incoming signal being detected is determined not an electronic message;

an electronic message exporting means for delivering said electronic messages via a transmitting means to a receiving device wherein said electronic message exporting means including a television interface means for delivering said electronic messages via said transmitting means to a television for displaying said electronic messages thereon;

said user interface means further including an message exporting control means for controlling a display of said electronic message on said television;

an automatic registration means for storing required registration data therein and for automatically dialing and registrating with a network server for receiving said electronic messages therefrom; and

a message full means for terminating a reception of said electronic messages when said message storage means reaching a full storage capacity.

16. The telephonic apparatus of claim 15 further comprising:

a message screen means for detecting designated message identifications in said electronic messages for receiving and storing said electronic messages with said designated message identifications.

17. The telephonic apparatus of claim 16 further comprising:

a removable data storage means for storing said electronic messages therein for removably transferring said electronic messages therefrom.

18. The telephonic apparatus of claim 15 further comprising:

an automatic logon means for automatically dialing and logging on a network server periodically for receiving said electronic messages therefrom.

19. The telephonic apparatus of claim 15 wherein:
said telephonic apparatus being provided for receiving a plurality of message units; and
said user interface means including a message unit access Control means for controlling an access to each of said plurality of message units.

20. A method for providing communication between a local electronic message server and a telephone user connected with telephone line to the server comprising the steps of:
(a) providing a telephonic electronic message apparatus (which including a means for adapting] adaptable to said telephone line for receiving electronic messages from said local server; and
(b) providing a processing means for said telephonic electronic message apparatus for automatically receiving electronic messages for storing said messages therein whereby said electronic messages may be received and stored without requiring a human operation.

21. An electronic message communication system comprising:
a local electronic message server connected to an internet system for receiving said electronic messages therefrom and sending said electronic messages thereto;
a telephonic electronic message apparatus connected to said local electronic message server by a telephone line wherein said telephonic electronic message apparatus includes a means for adapting to said telephone line; and
said telephonic electronic message apparatus further includes a processing means for automatically receiving said electronic messages transmitting from said local server through said telephone line for storing said messages in said telephonic electronic message apparatus whereby said electronic messages may be received and stored without requiring a human

operation.

22. The electronic message communication system of claim 21 wherein:

said telephonic electronic message apparatus includes a registration trigger means and an automatic registration dial-up means for automatically sending a plurality of identification messages to said local server for registration upon an actuation of said registration trigger means; and

said local electronic message server includes a registration processing means for receiving said plurality of identification messages for processing a registration Of said telephonic electronic message apparatus in said local server.

23. The electronic message communication system of claim 21 wherein:

said telephonic electronic message apparatus includes an auto collect triggering means and an collect dial-up means for automatically sending a plurality of auto collect messages to said local server upon an actuation of said auto collect trigger means; and

said local electronic message server includes an auto collect processing means for receiving and responding to said plurality of auto collect messages for automatically sending a plurality of electronic messages to said telephonic electronic message apparatus.

24. The electronic message communication system of claim 21 wherein:

said local electronic message server includes an message priority processing means for checking a priority of each of said electronic messages and for sending each of said electronic messages to said telephonic electronic message apparatus according to said priority.

25. The electronic message communication system of claim 21 wherein:

said local electronic message server includes a storage capacity processing means for checking a storage capacity of said telephonic electronic message apparatus and for sending said electronic messages thereto according to said storage capacity whereby a message overflow of said telephonic electronic messages apparatus may be prevented.

26. The electronic message communication system of claim 22 wherein:

said automatic registration dial-up means provided for automatically sending a plurality of said identification messages including a telephone number, a machine number and a user password.

27. A method for sending and receiving electronic mail messages over an interconnected network of computers where one of said interconnected computers is configured to receive mail messages having a particular domain address, said configured computer electronically connected to one or more mail servers each designated for a particular geographical region and each electronically connected to one or more electronic mail messaging devices each having a particular address within said domain address for receiving electronic mail messages addressed to said particular address, wherein each of said devices contains dedicated electronic circuitries for sending, receiving, and storing electronic mail messages, said method comprising the steps of:

receiving one or more electronic mail messages each addressed to a particular address within said domain address;

determining the mail server for delivering each of the electronic mail messages in accordance to their respective particular addresses;

packaging the electronic mail messages for a mail

server into a mailbag for delivery;

sending said mailbag to said mail server;

unpackaging said mailbag and recontructing the electronic mail messages from said mailbag at said mail server; and

delivering each of the electronic mail messages to the corresponding electronic mail messaging devices.

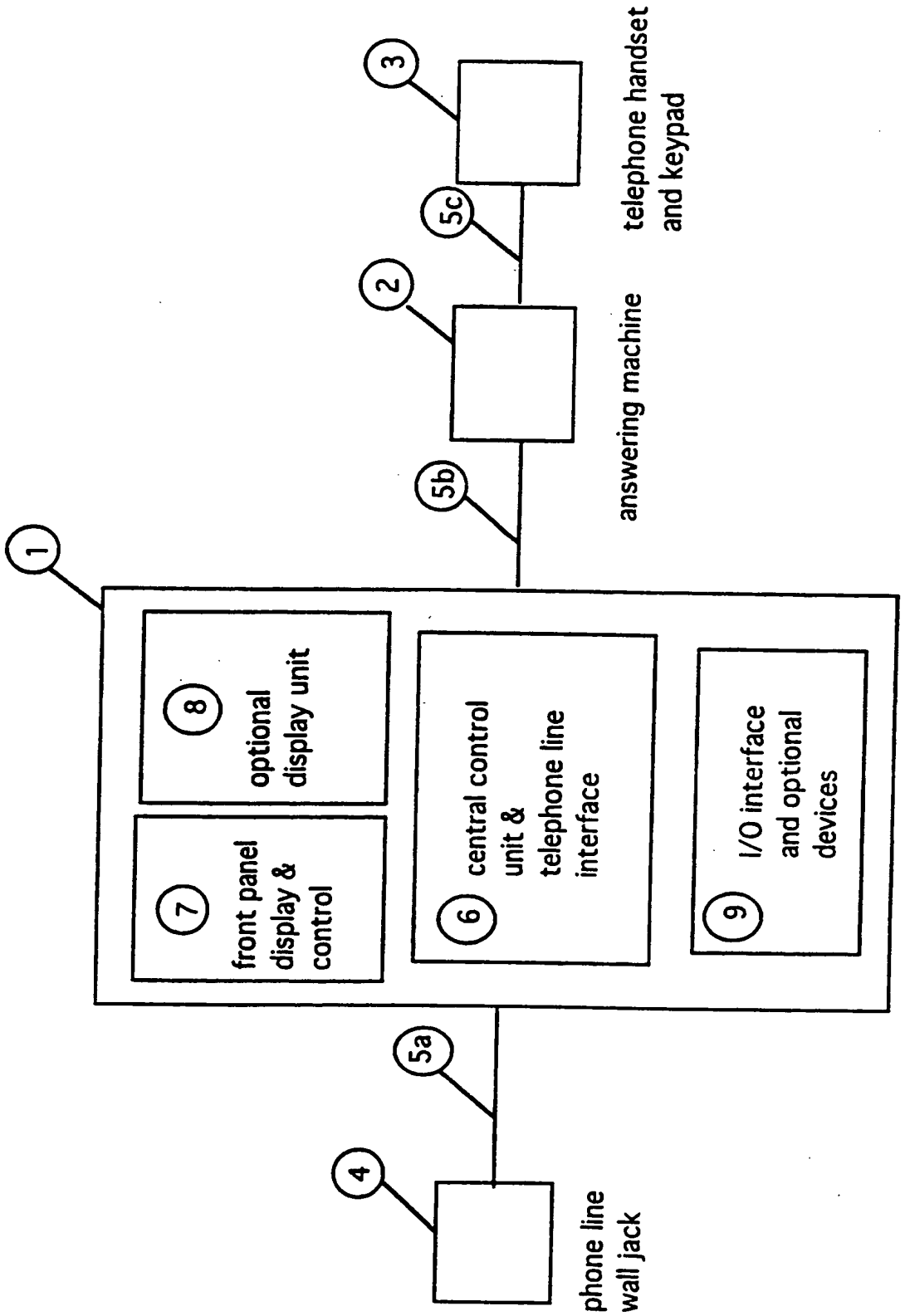


Fig. 1 connection of E-mail apparatus and telephone & answering machine

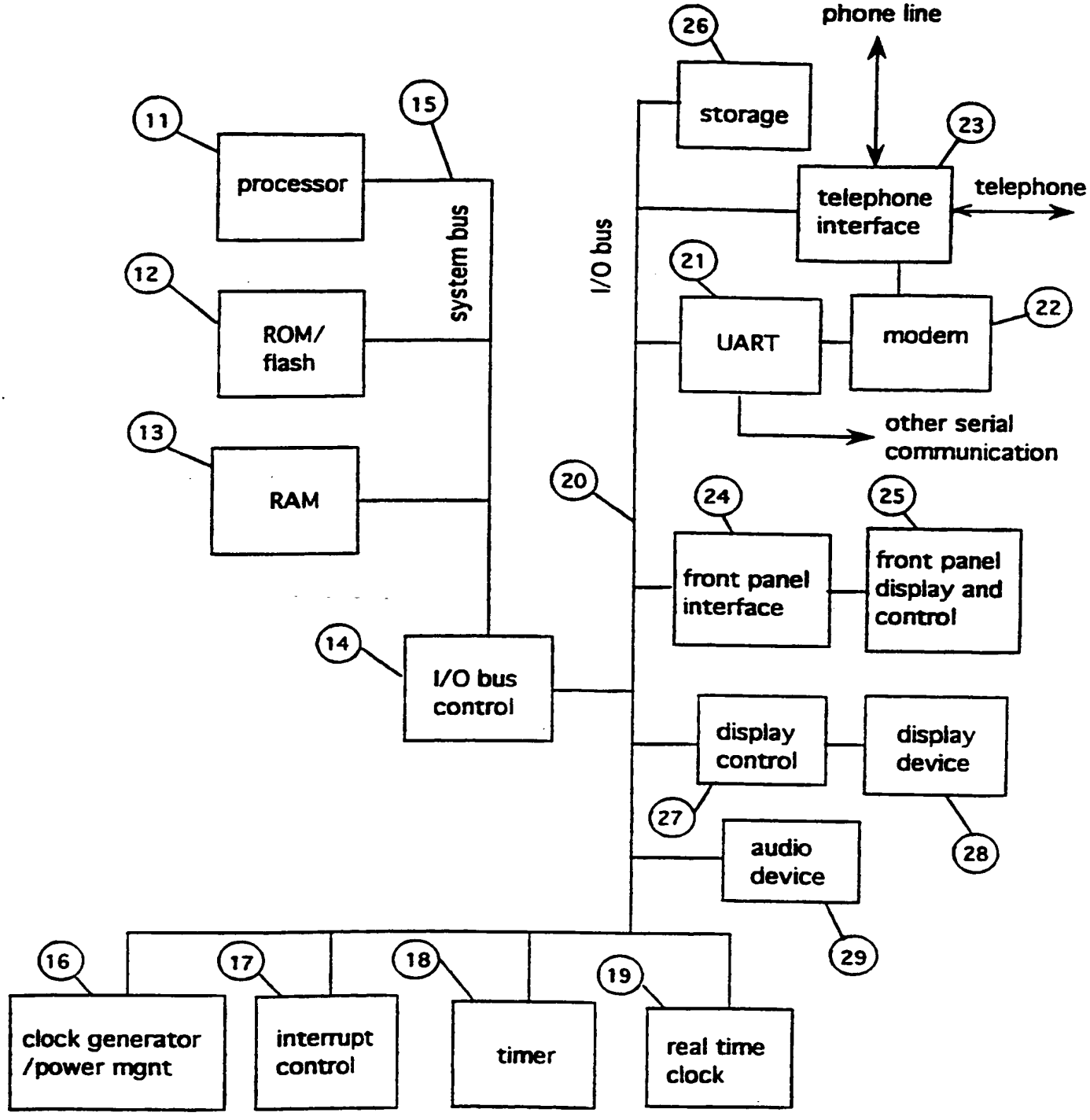


Fig 2.Block diagram of the E-mail apparatus

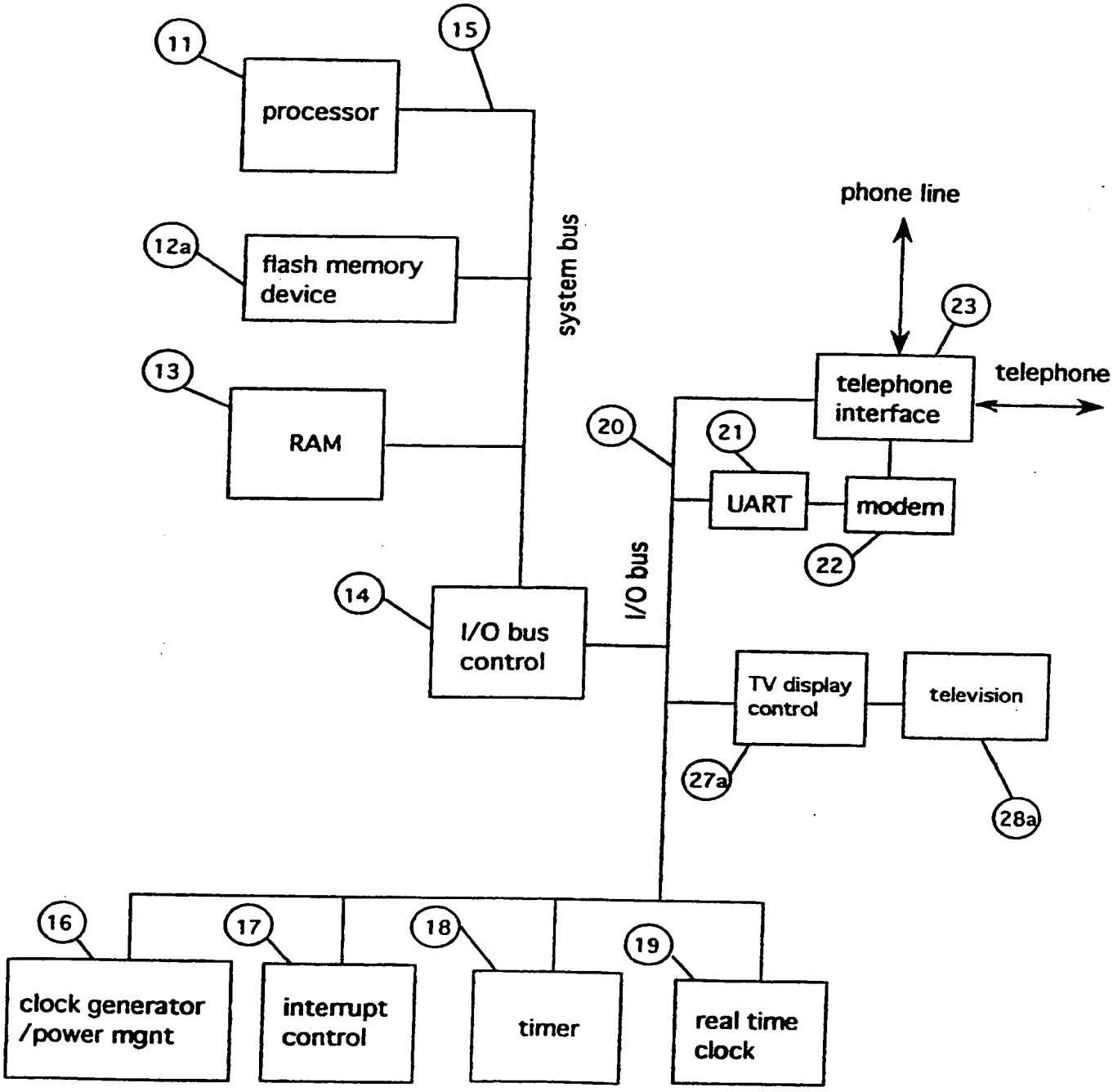


Fig 2a. Example of the E-mail apparatus implementaiton

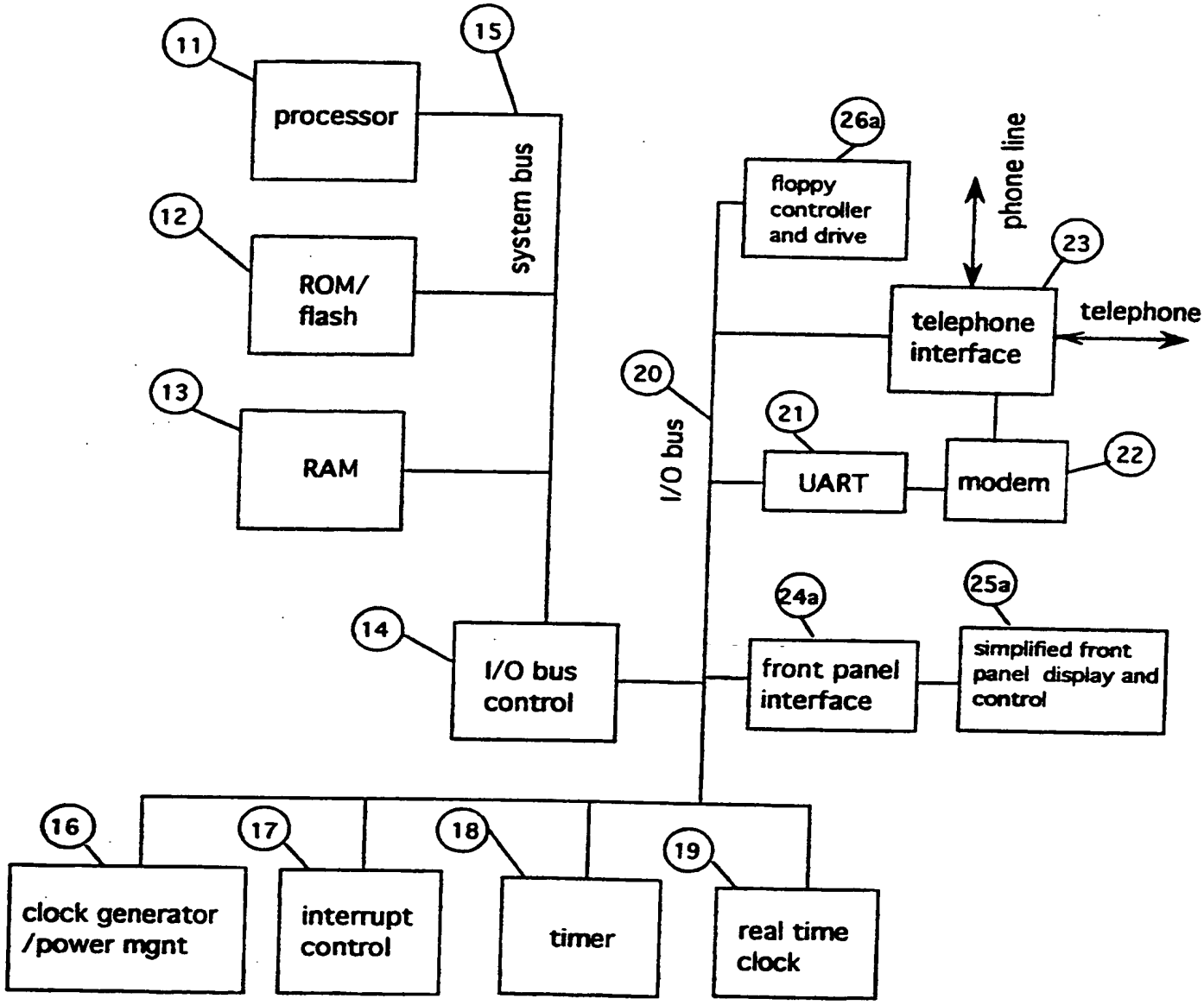


Fig 2b. Example of the E-mail apparatus implemention

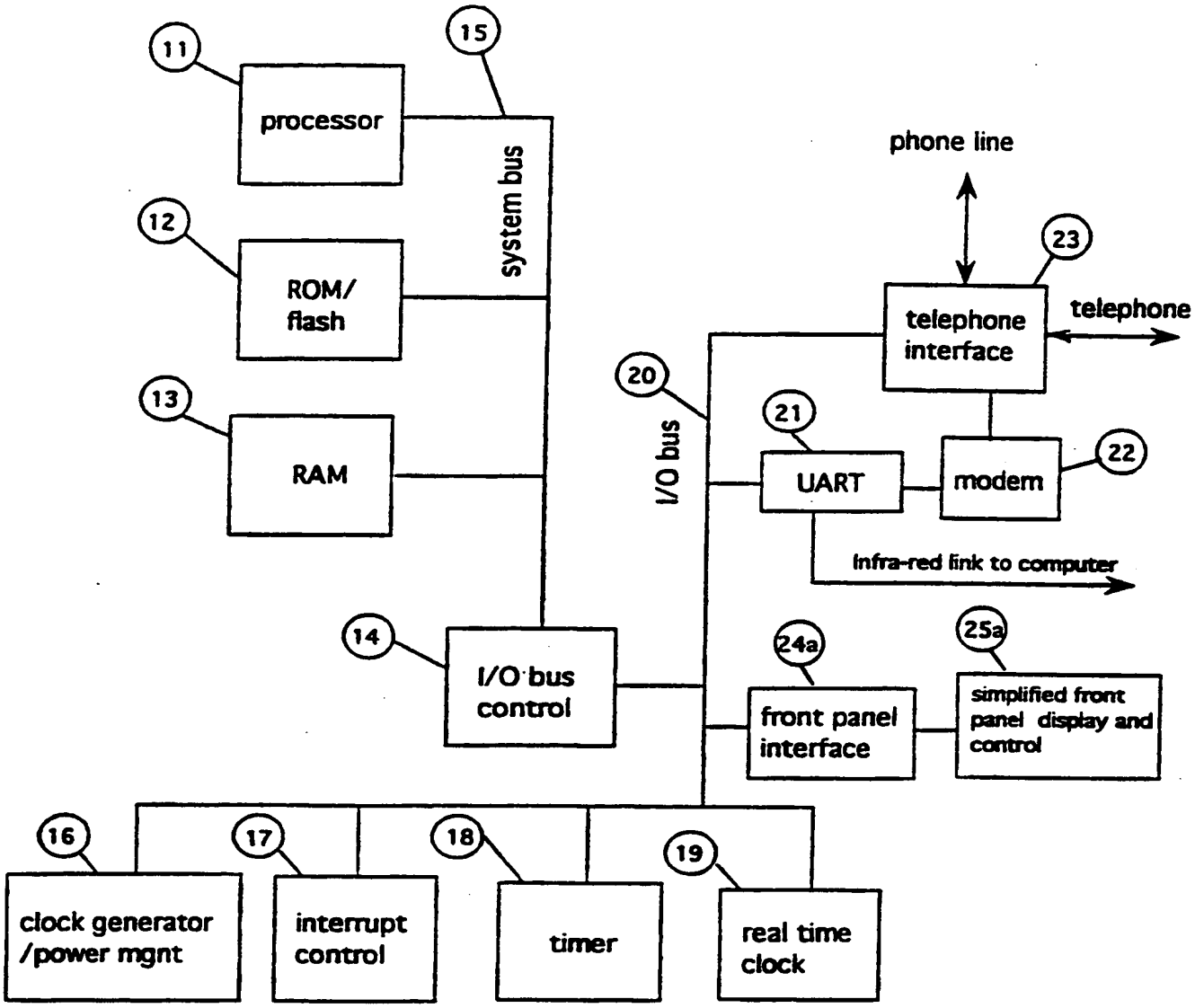


Fig 2c. Example of the E-mail apparatus implementation

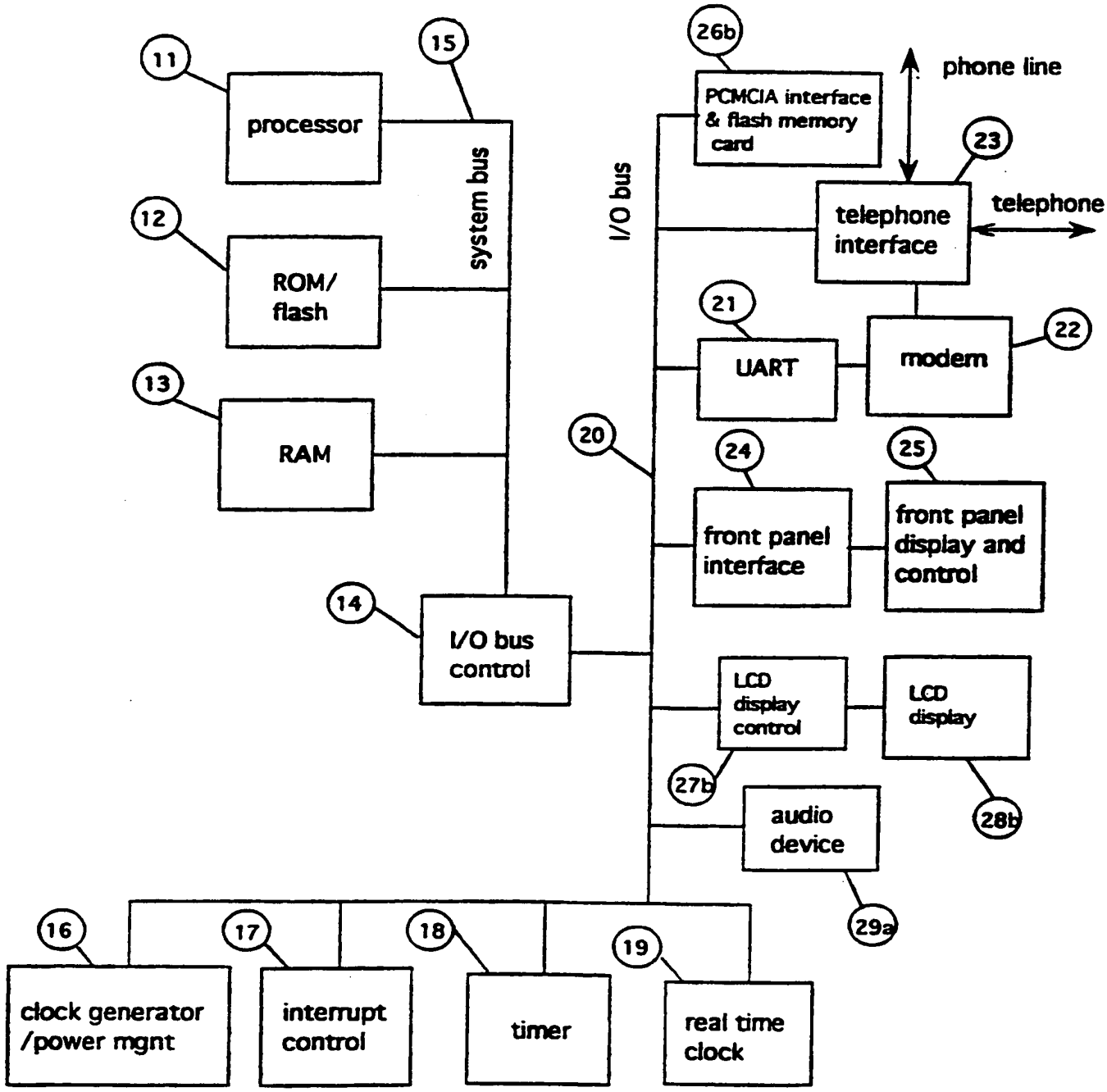


Fig 2d. Example of the E-mail apparatus implementation

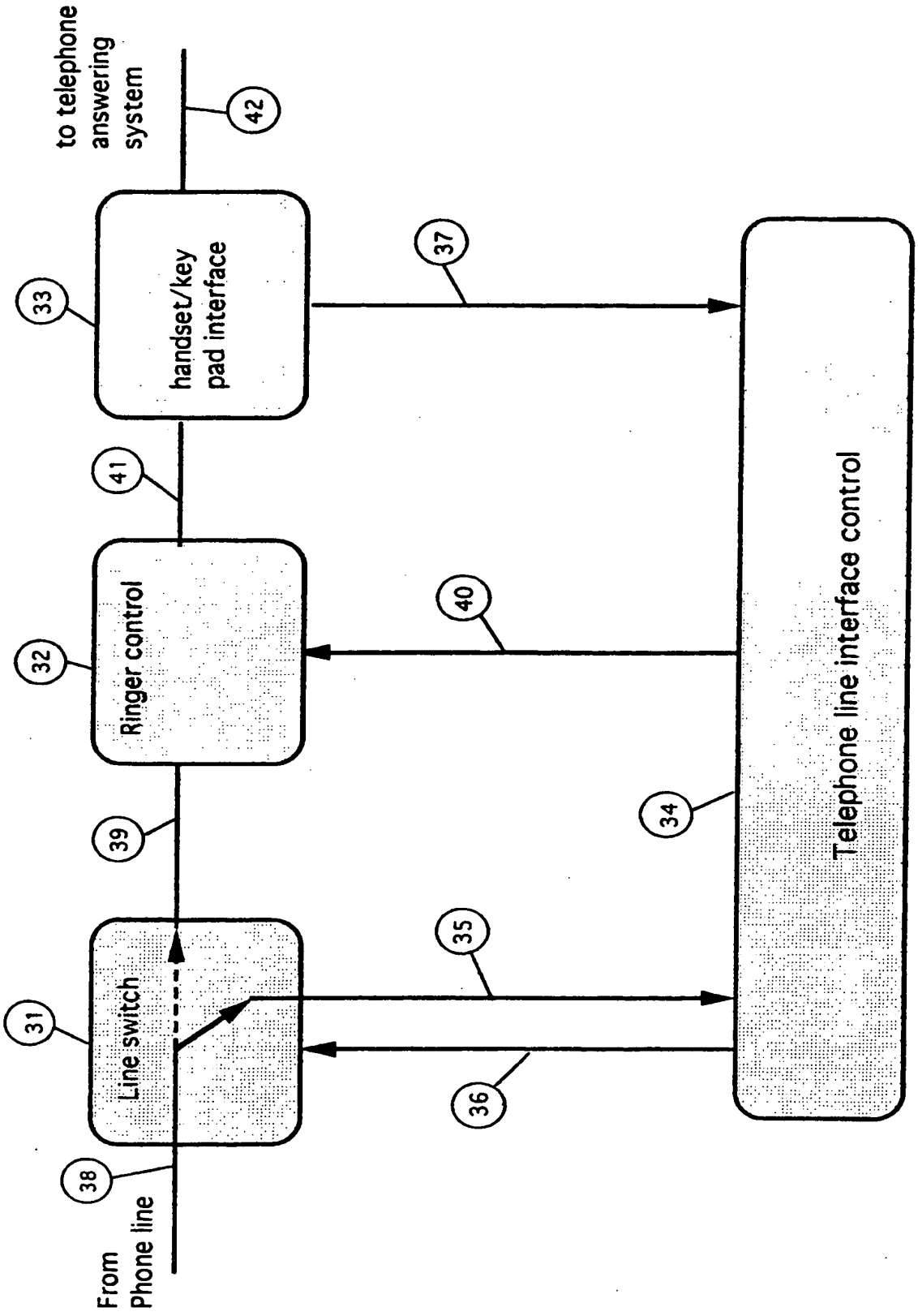


Fig. 3 Telephone interface block diagram

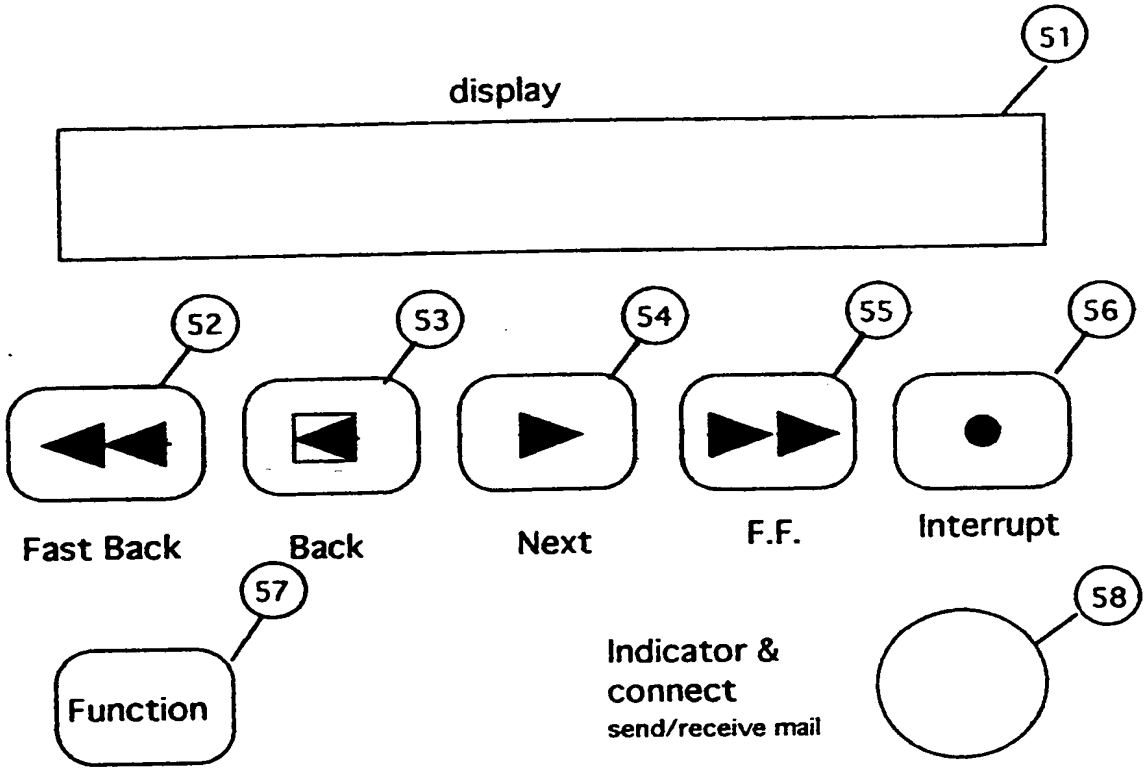


Figure 4: Front panel interface

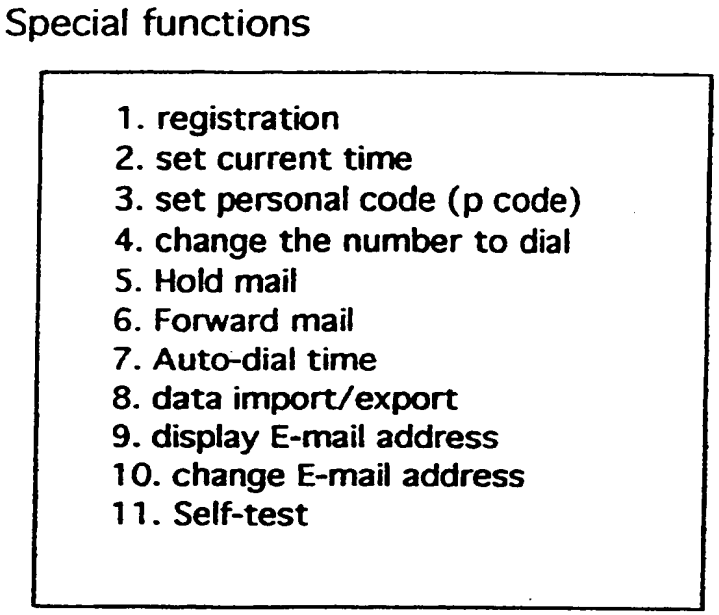


**Figure 5: Example of special functions men**

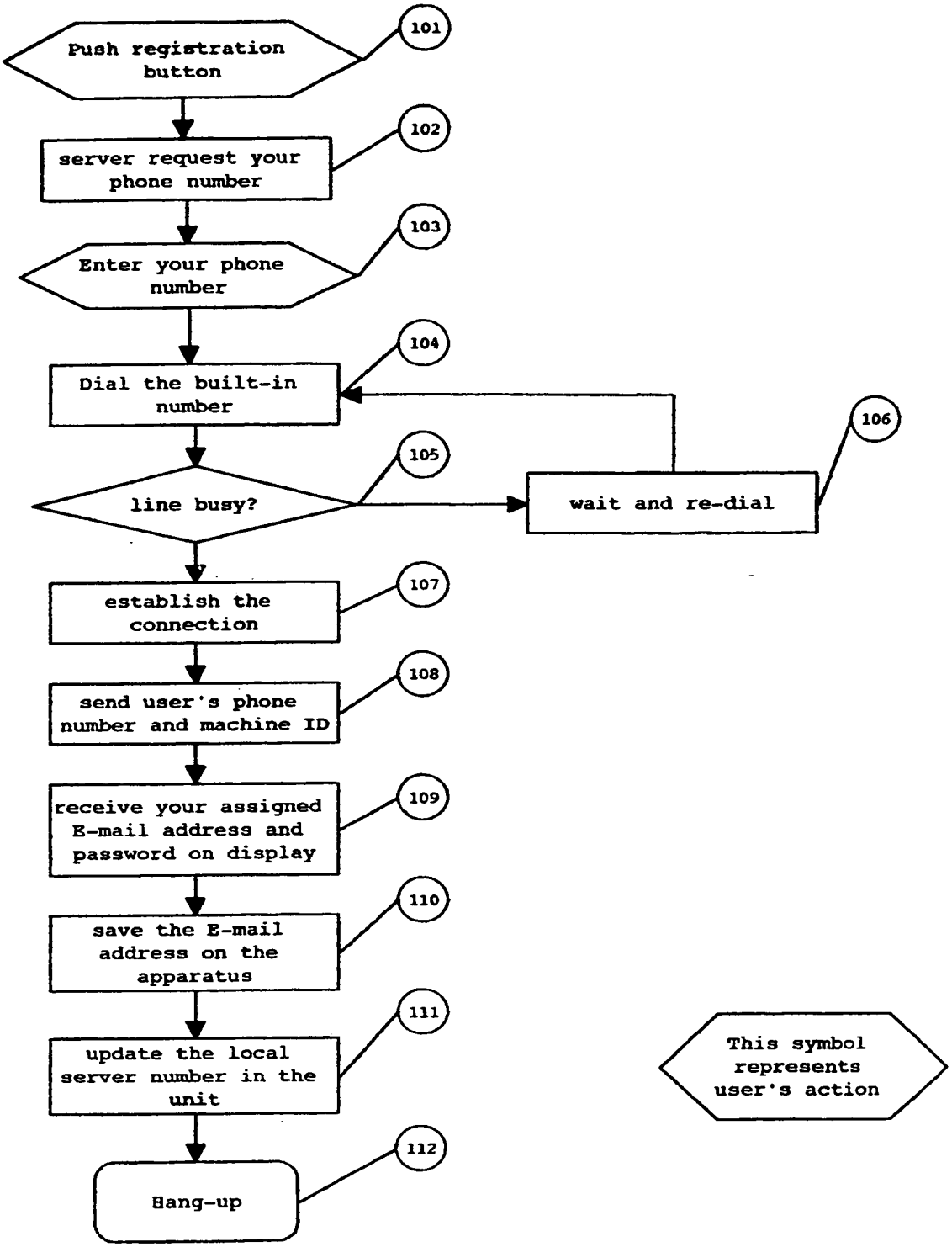


Figure 6: Easy registration flow

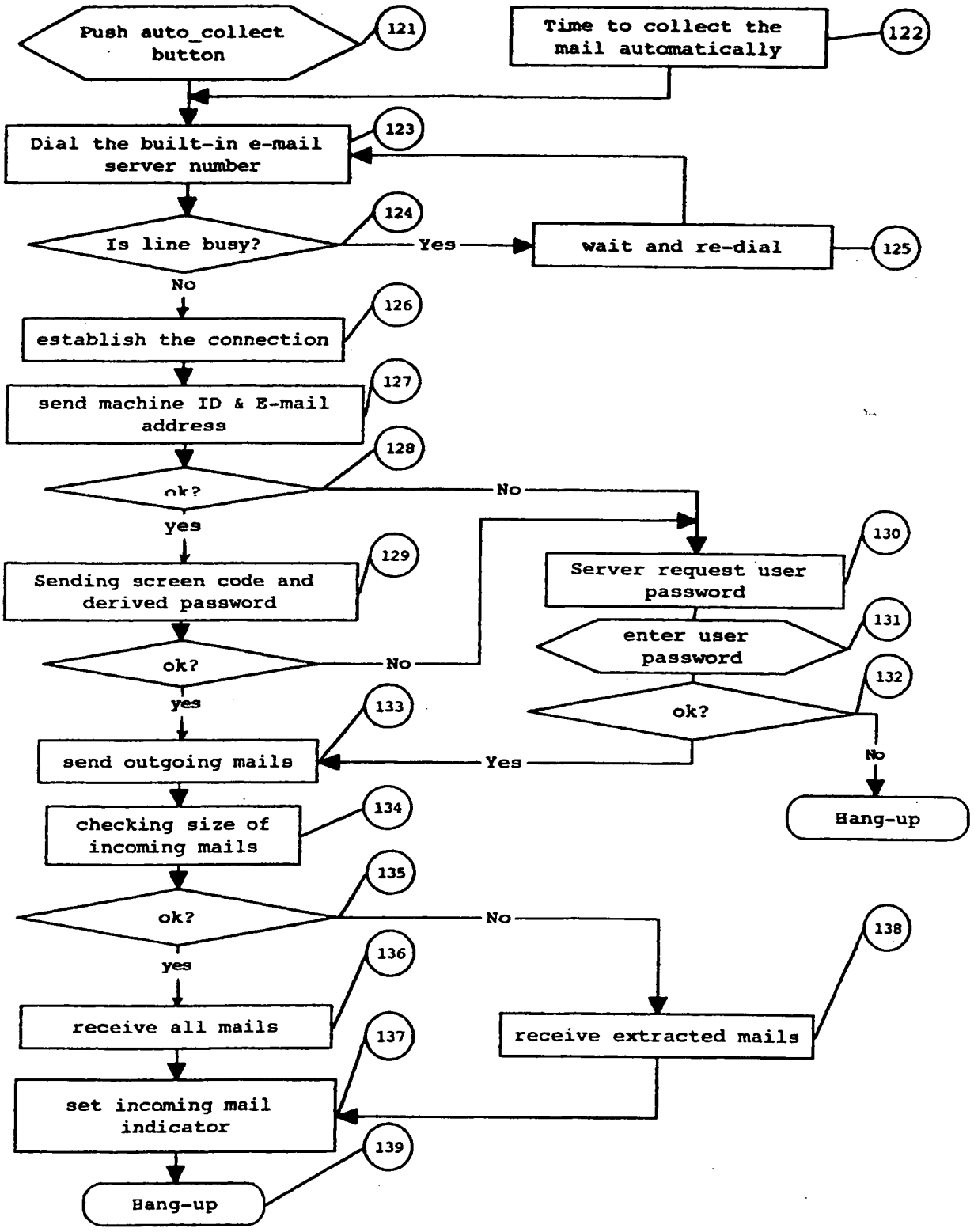


Figure 7: E-mail collect flow

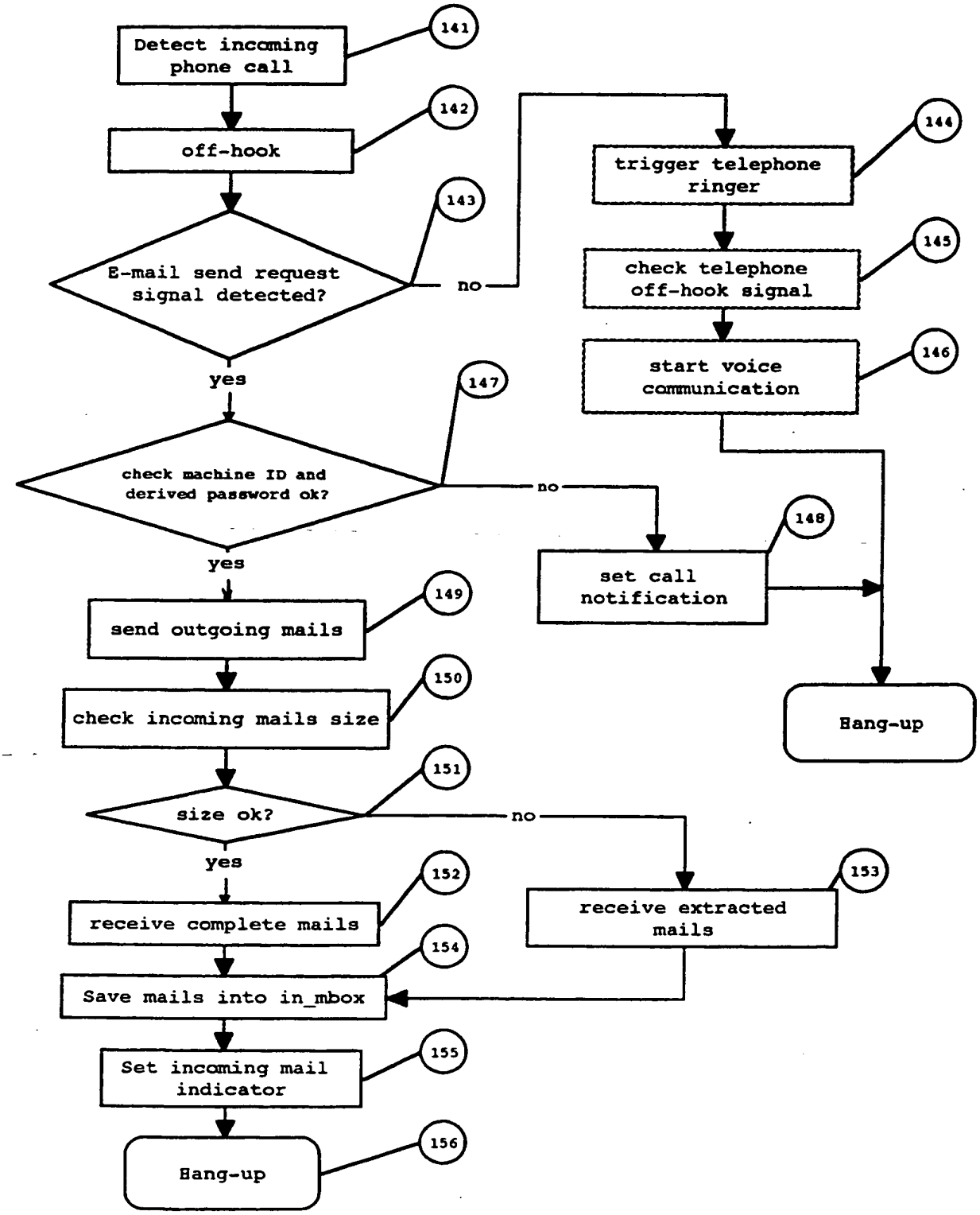


Figure 8: Apparatus's response to E-mail server delivery request

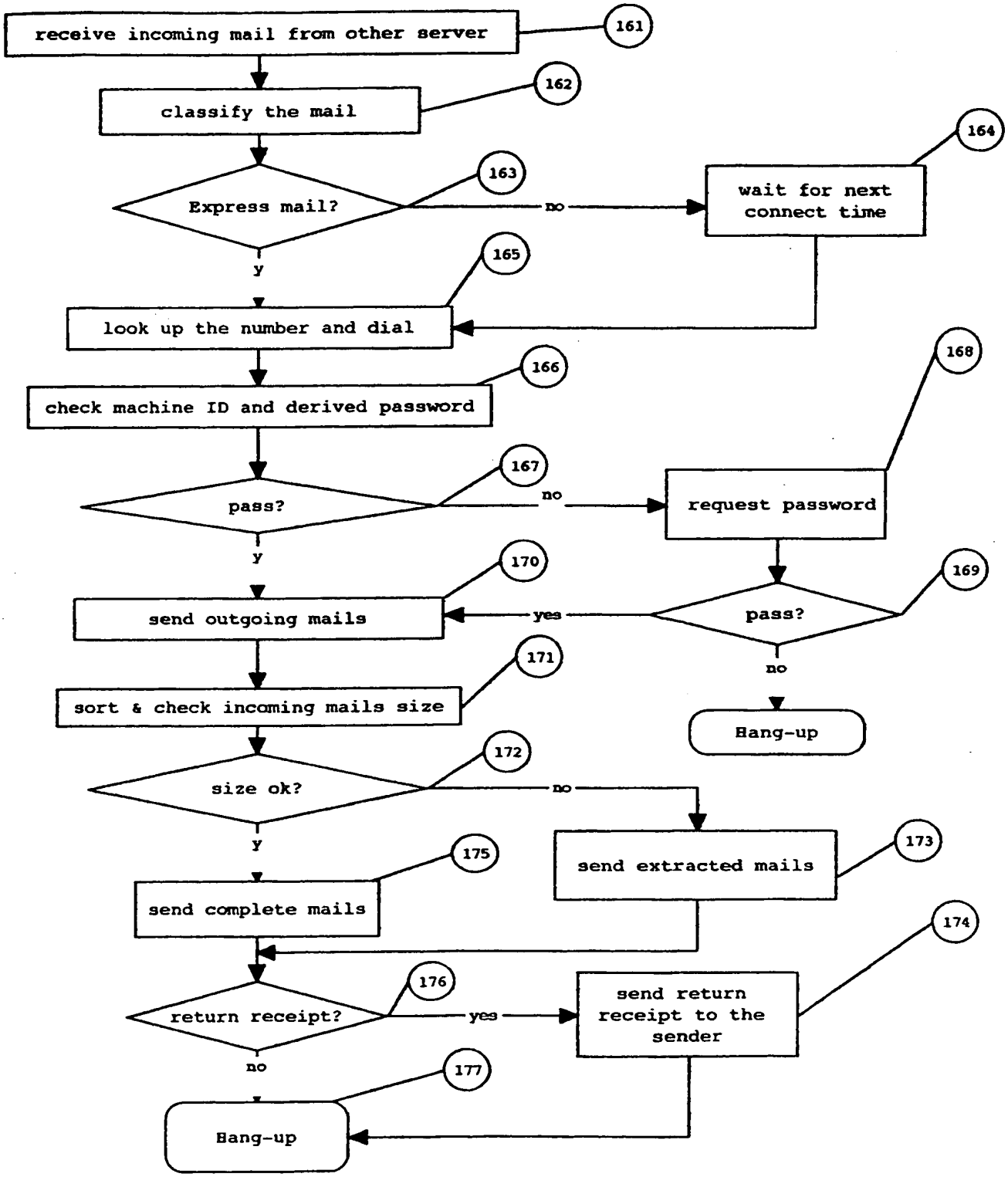


Figure 9:E-mail server mail process flow

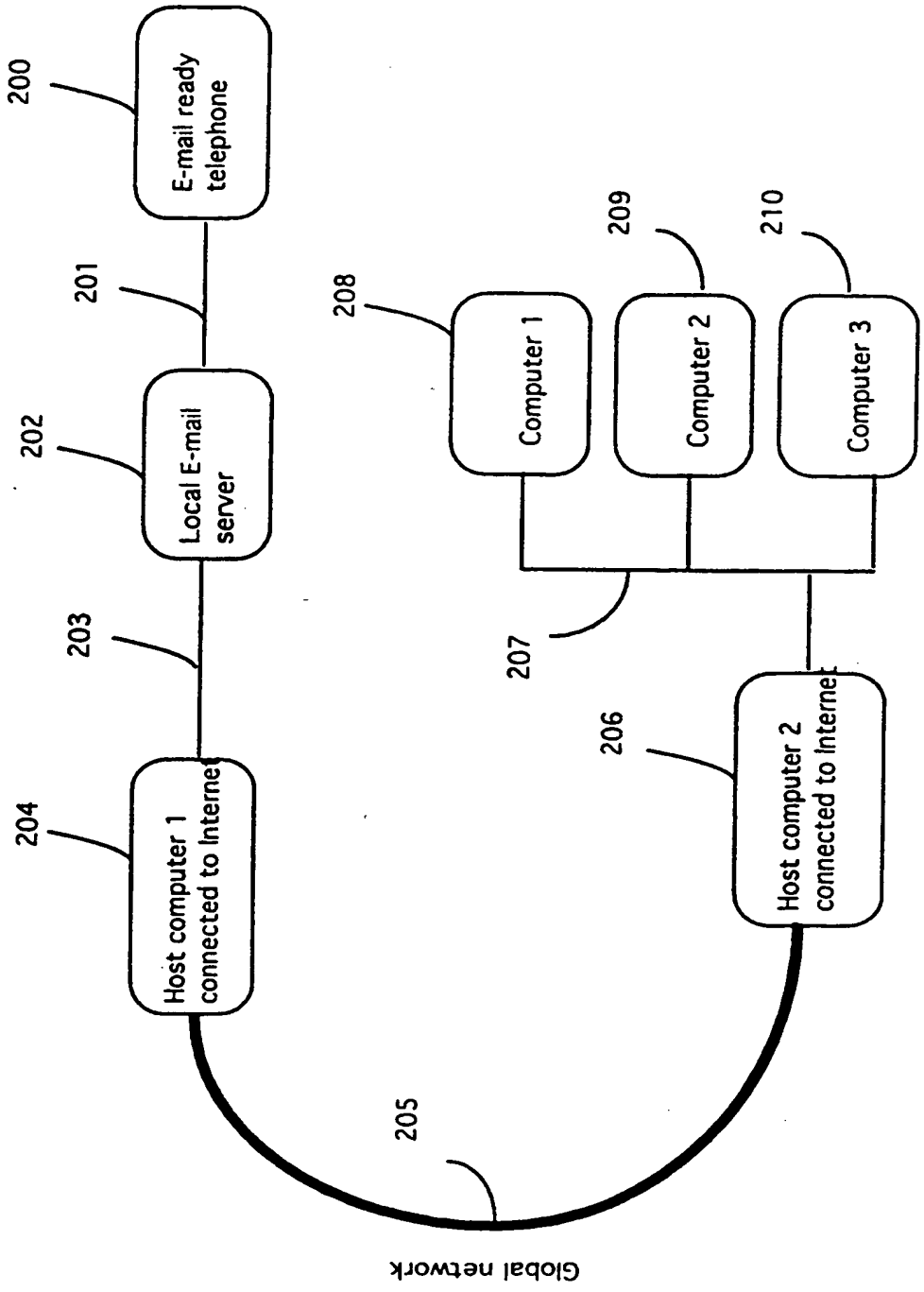


Fig. 10 Network connection diagram

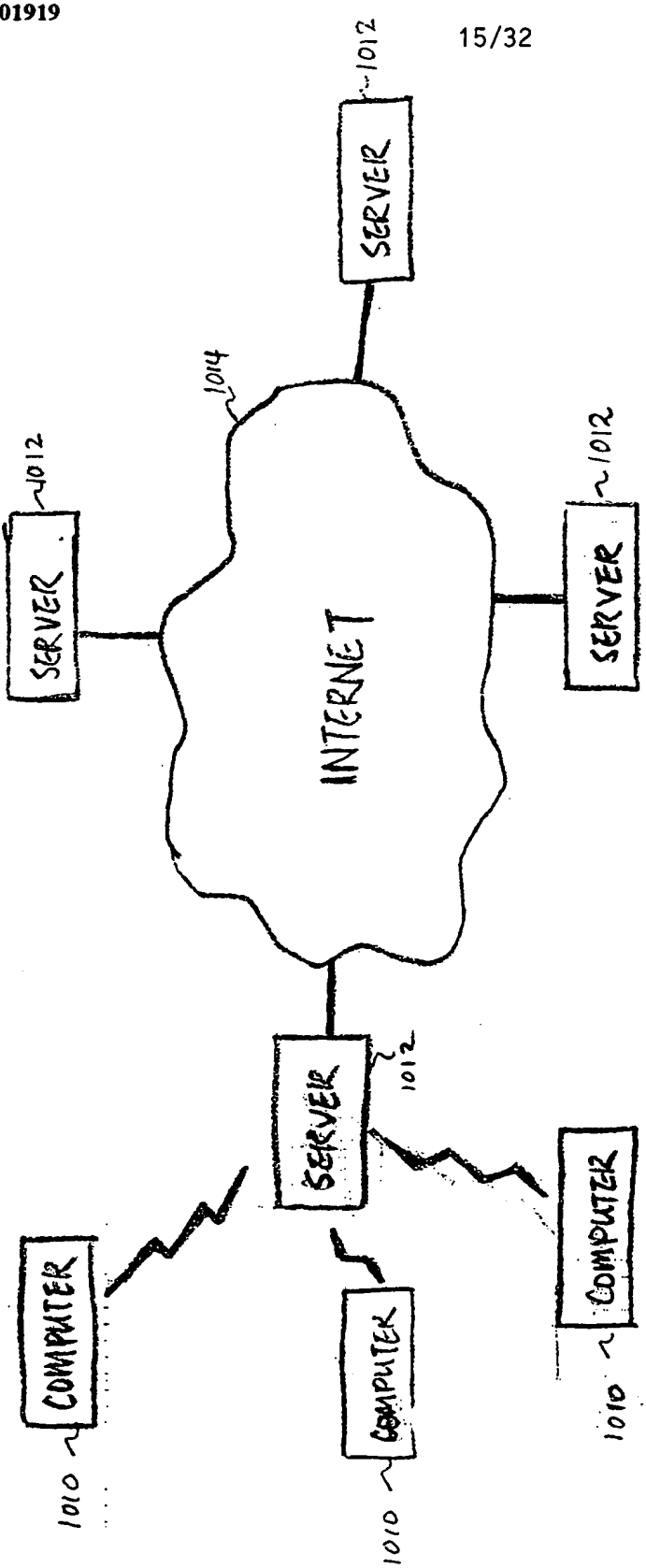


Fig. 11

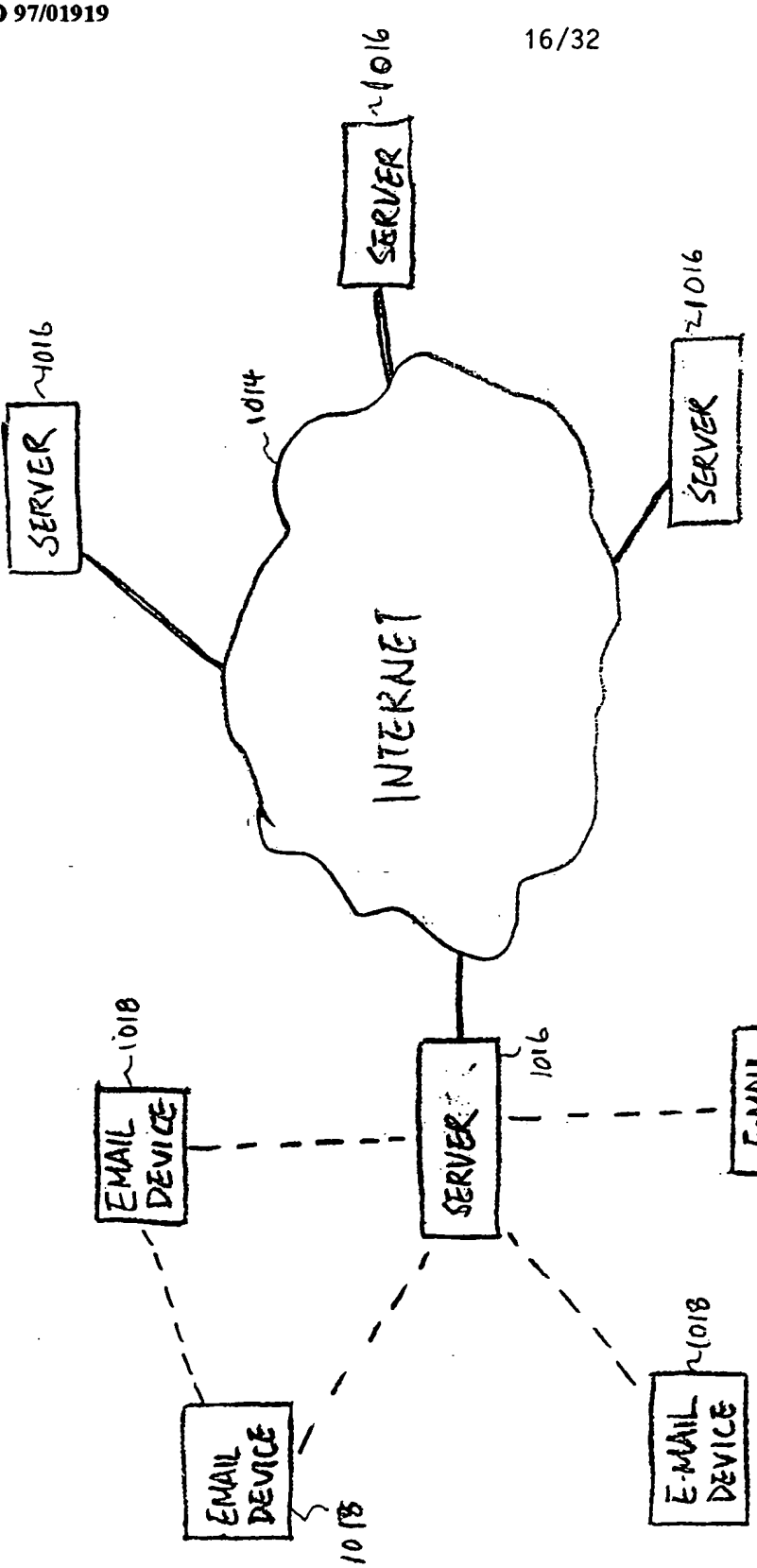


Fig.12

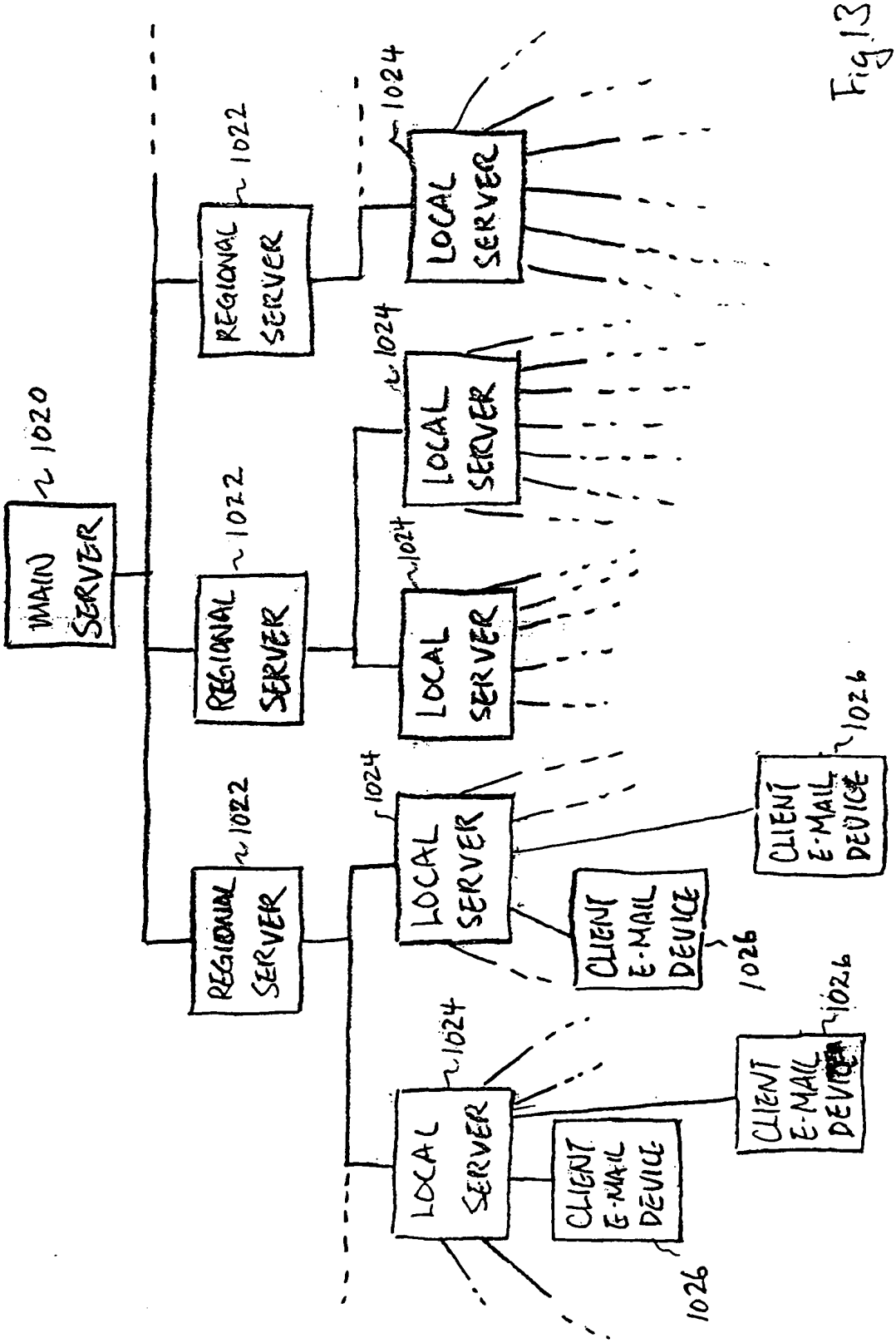


Fig. 13

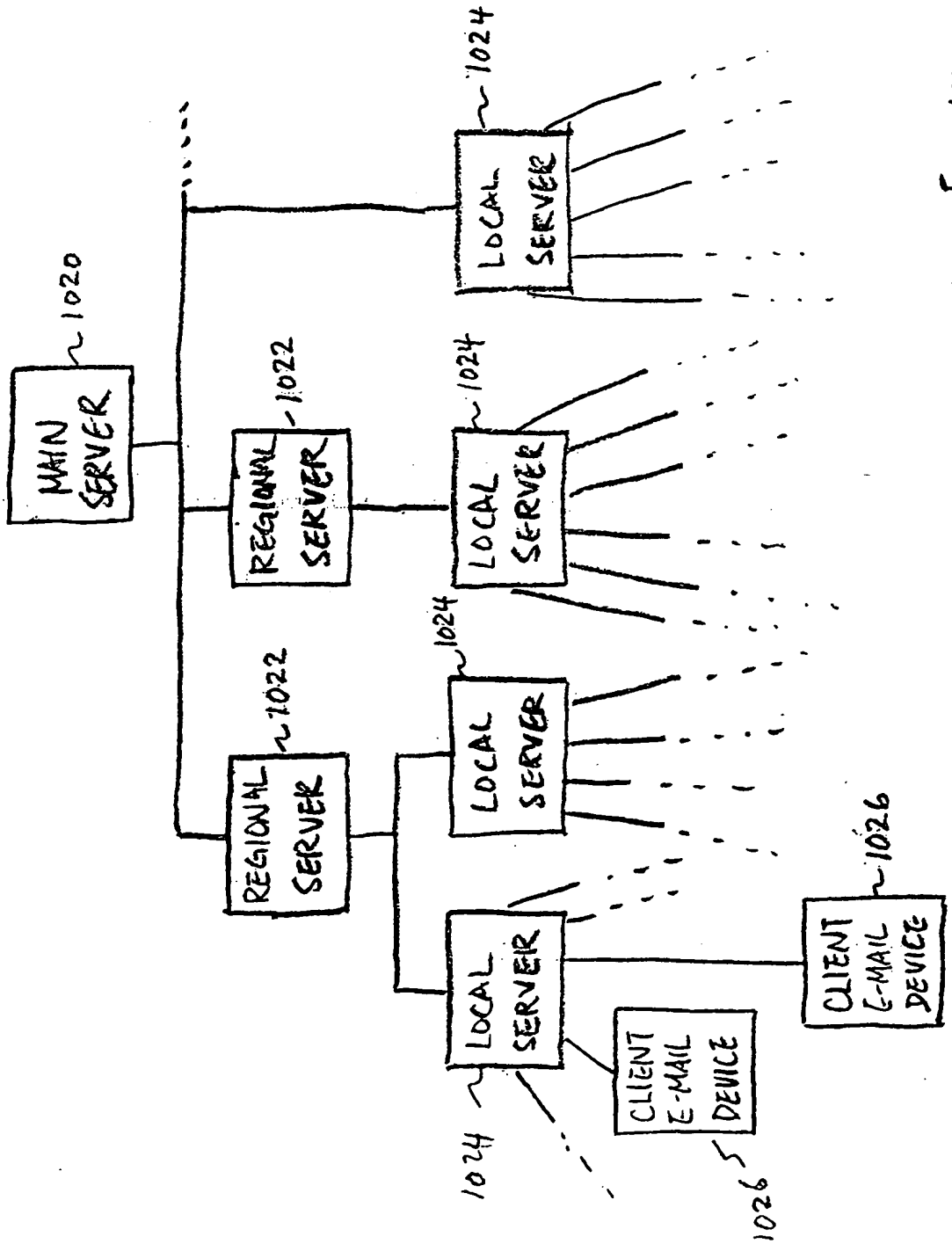


Fig. 14

Fig. 15

Registration process:
get machine id
get security code
get notification code from e-mail device
get phone number for e-mail device
search for the phone number of the corresponding local server
send local server phone number to e-mail device
update tables for this client



Fig. 16a

Main Mail Process:
Every x minutes
Process_Incoming_mail
Process_Outgoing_mail

Fig. 16b

Process_outgoing_mail:
Check for new outgoing mailbag every x minute
if new outgoing mailbag found,
for each new outgoing mailbag
decompress mailbag
extract outgoing mail messages
pass outgoing mail messages to send mail utility

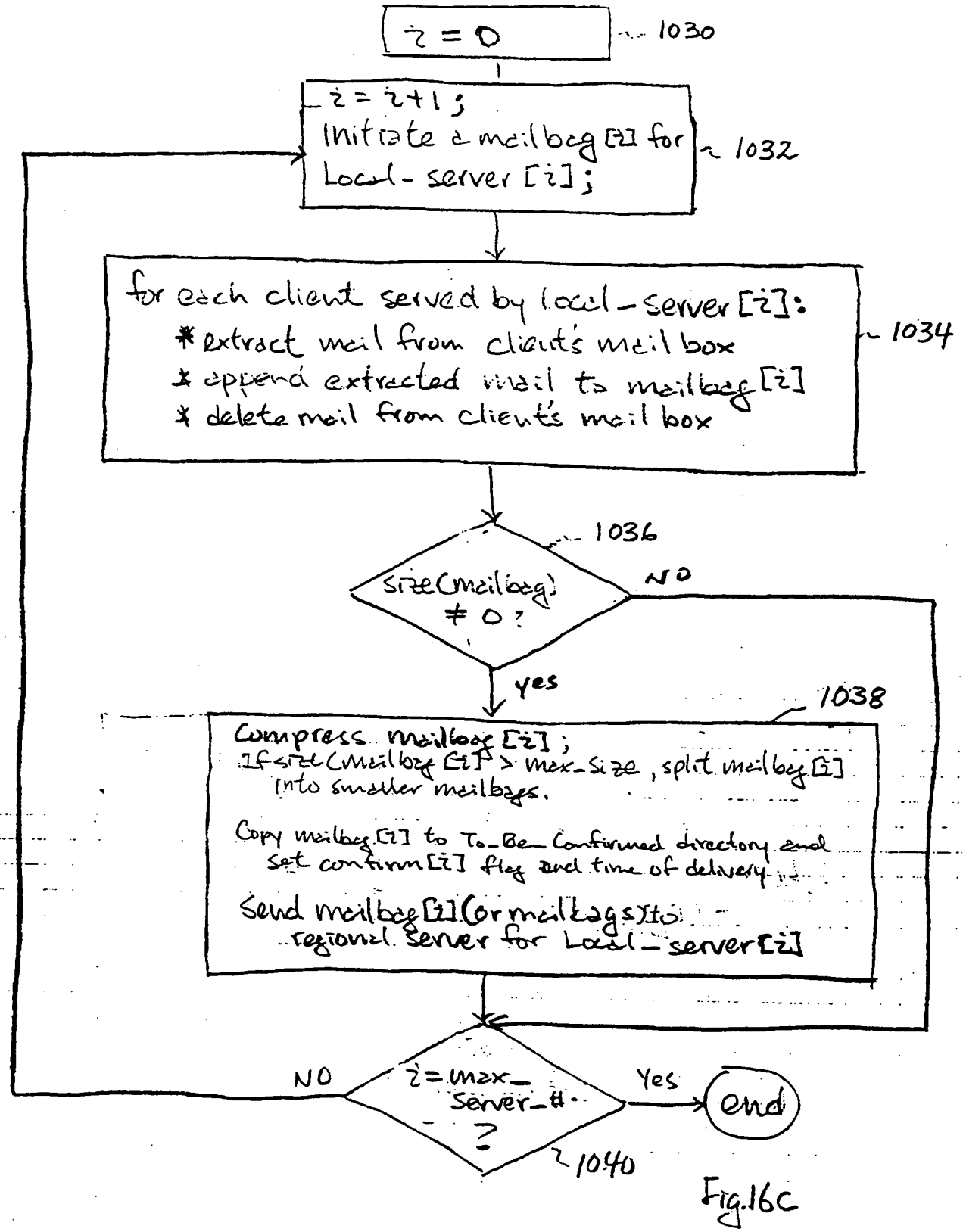


Fig.16C

confirm

```
Every W minutes
  for each confirm[i] = true
      Search confirmation mail message from local server
      If confirmation found                                  [i];
          If NOT all mail message in mail log[i]
              are delivered
              If elapse time > max_elapse_time,
                  extract and place undelivered
                    mail message in delivery_failed
                    directory;
                  notify operator;
      If confirmation not found and
          elapse time > max_elapse time,
          notify operator;
```

Fig 16d

Fig. 17a

```
Every x minutes
    get mailbox from regional server
    decompress mailbox
    extract mail messages from mailbox
    identify & place mail into recepent clients
      m_box
```

Fig 17b

```
Every x minutes
  For each client[i]
    if client[i].m_box is not empty
      Case (Notification Method):
        notify_only:
          notify_process;
        call_back_mail_delivery:
          call_back_mail_delivery;
        Direct_mail_delivery:
          direct_mail_delivery;
      end
```

Fig 17c

```
Notify_process:
    Get last_logon_time of client[i]
    check_new_mail_for_client[i]
    if no new mail or if notification has been sent already, exit;
    else
label 1: call (client[i] phone number)
        if busy, wait x minutes and goto label 1;
    detect_ring_tone for client[i].x1 second & disconnect;
    wait w1 second;
    Call(client[i] phone number); if busy, wait x minutes and goto label 1;
    detect_ring_tone for client[i].x2 second & disconnect;
    wait w1 second;
    Call (client[i] phone number); if busy, wait x minutes and go to label 1;
    detect_ring_tone for client[i].x3 second and disconnect;
```

```
Call_back_Mail_Server {
        try_counter = 0.
Label2: Notify_Process );

        Set Auto Answer for x period of time

        If Client Calls back within x period of time
            Begin
                Handshake;
                Exchange_Mail_Files;
                Disconnect;
                Send_Confirmation_To_Server;
                Send_Outgoing_Mail_To_Server;
            End
        Else
            If try_counter > max_try
                Report error to server
            Else increment try_counter
                goto Label 2
        end
```

Fig. 17d

```
Direct_Mail_Delivery;

        Try_counter = 0

Label3: Call Client

        If no response from e-mail server
            Increment try_counter
            If try_counter > max_try
                report error to server
            Else
                goto label3
            end
        Else
            Handshake;
            Exchange_Mail_files;
            Disconnect;
            Send_Confirmation_To_Server;
            Send_Outgoing_Mail_To_Server;
        End
```

Fig. 17e

Fig 17g

```
Exchange_Mail_Files:
    Retrieve outgoing mail from client e-mail device;
    Get available storage size on the e-mail device;
    If incoming mail messages > available storage size
        Repackage_Mail_Messages;
    Send incoming mail to e-mail device;
    Disconnect;
```

Fig 17h

```
Repackage_Mail_Messages:
    Sort Incoming Mail in order of Priority
    Select Mail in Order of Priority upto available storage size
        for a system mail message indicating more
        mail message at the local server
```

Fig 17f

```
Handshaking:
    Check security code
    If security code incorrect
        disconnect;
        report unmatched security code to server
    ELSE
        Check machine ID
        If machine ID incorrect
            disconnect;
            report unmatched machine ID to server
    end
```

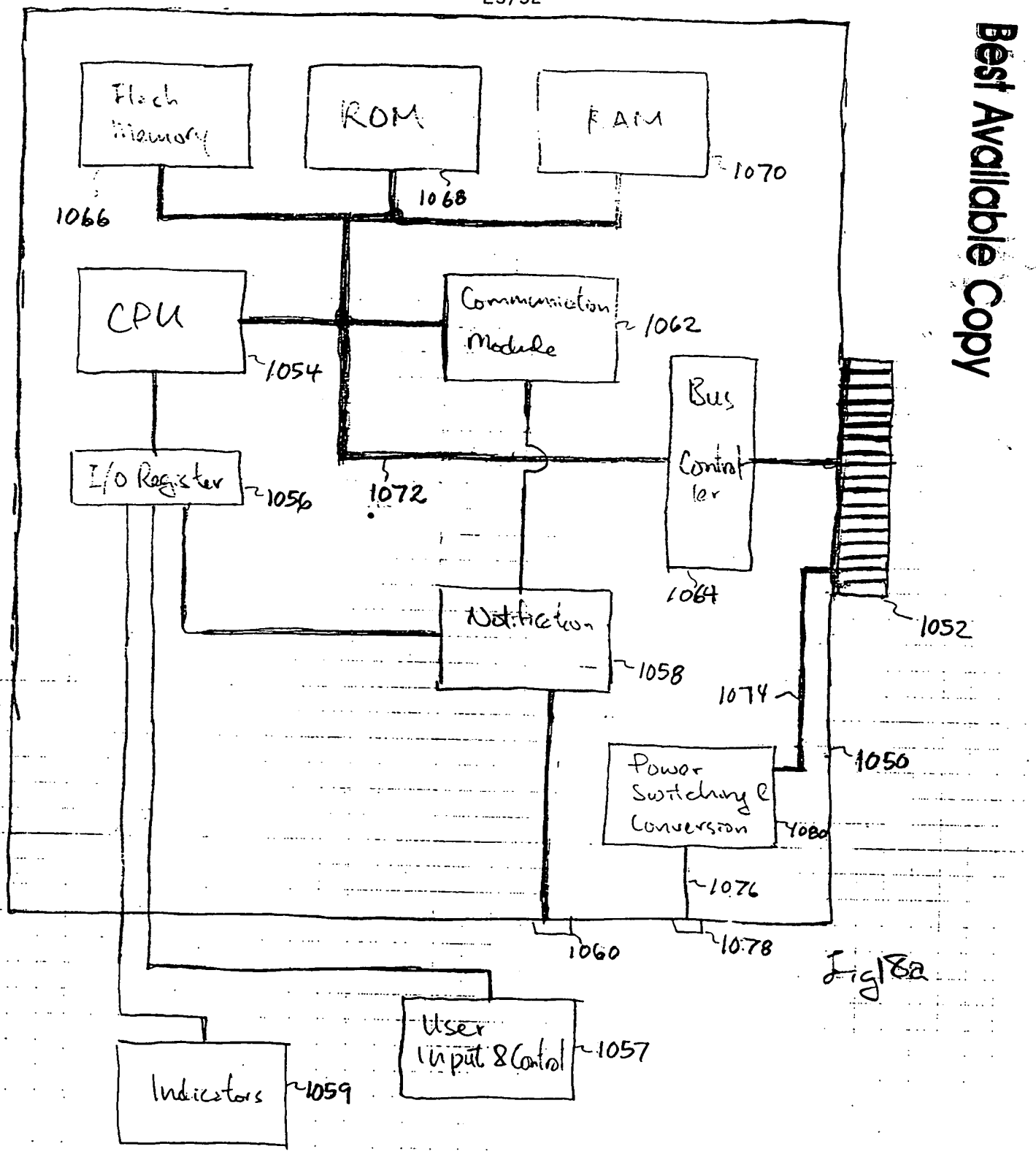


Fig 18a

Fig18b

```
procedure Get_mail;
        check_card_status
        if busy wait                                    // wait until it is not busy
        else
         begin
                check_inmail
                if not empty move the mail to host
                empty the inbox on card
                display_mail
         end
```

Fig18c

```
procedure Send_mail;
        check_card_status
        if busy wait                                    // wait until it is not busy
        else
          begin
                check_outmail_sapce
                if space available move the mail to card
                done
          end
```

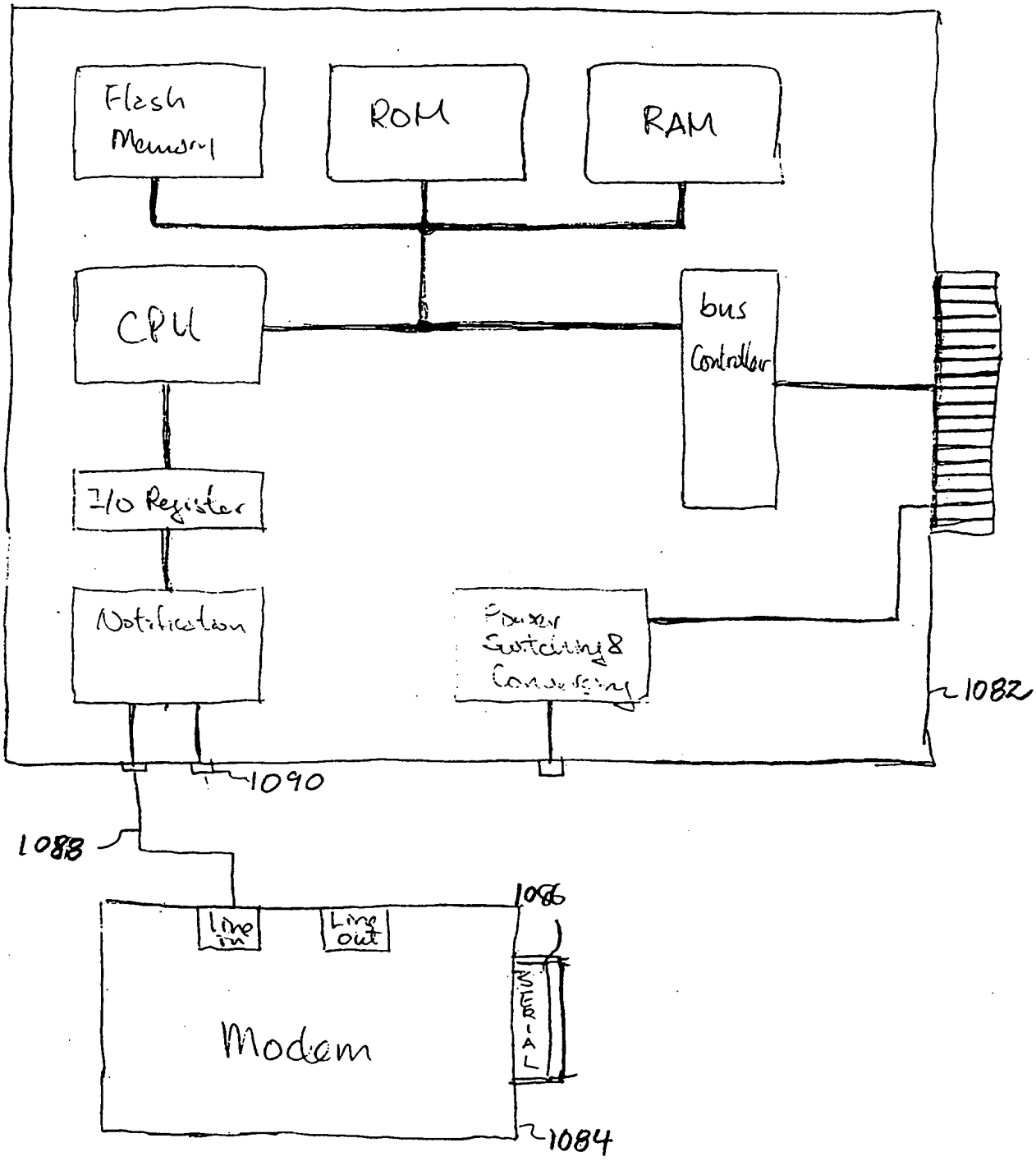


Fig 19a

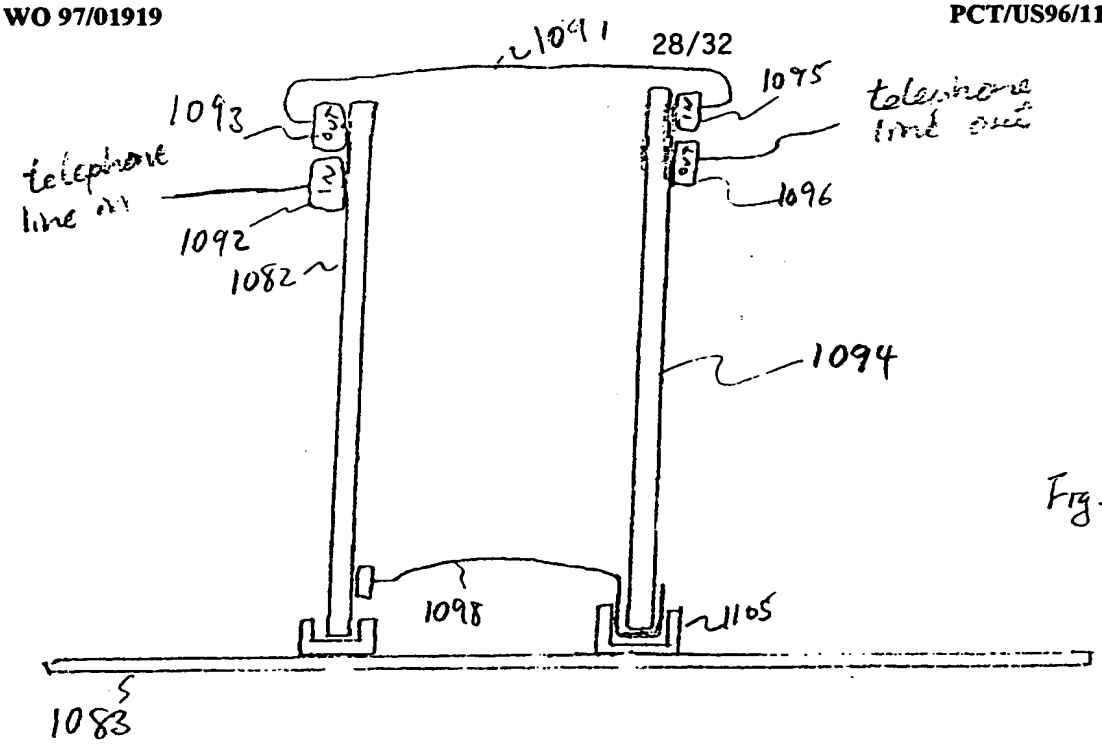


Fig 19b

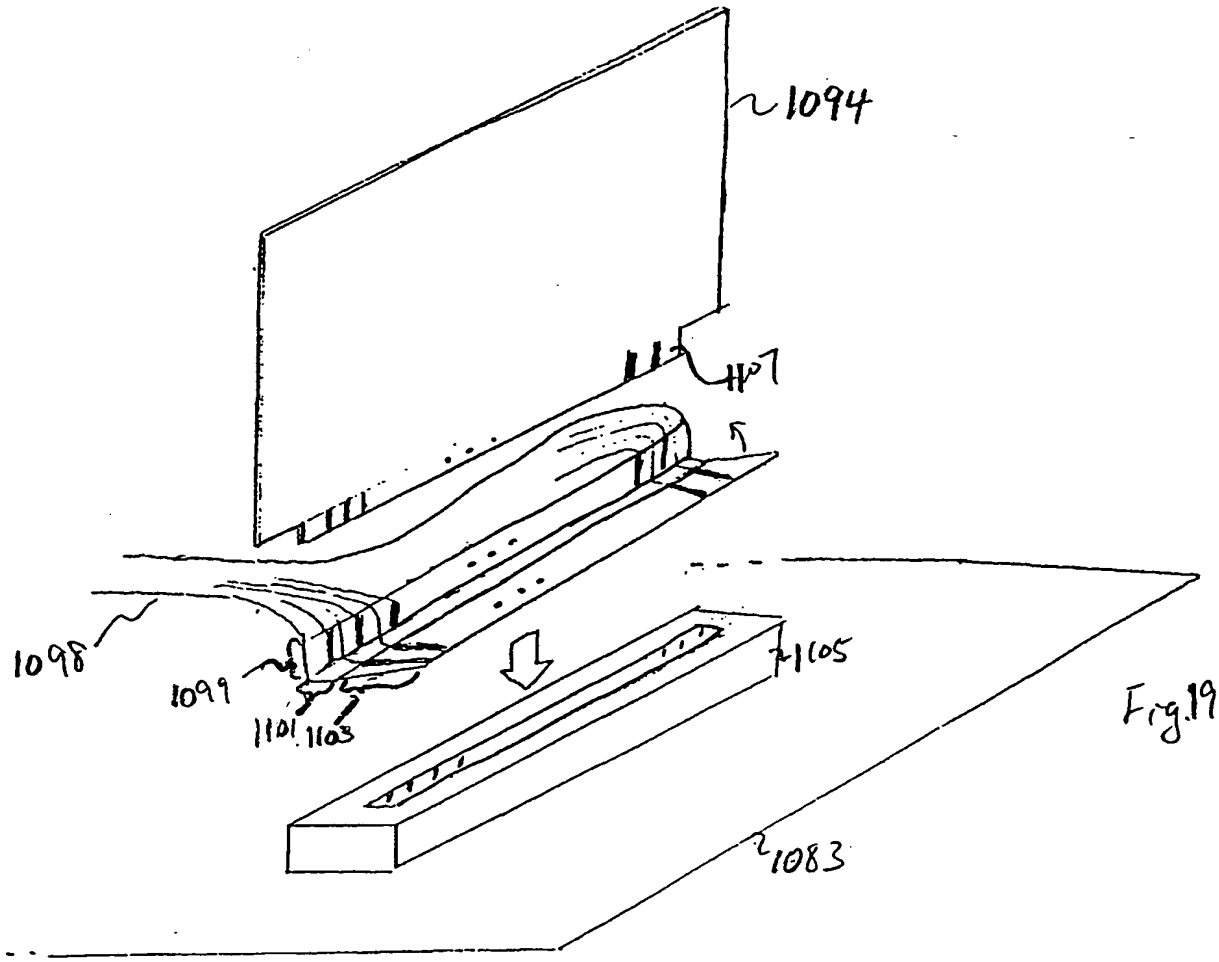


Fig. 19c

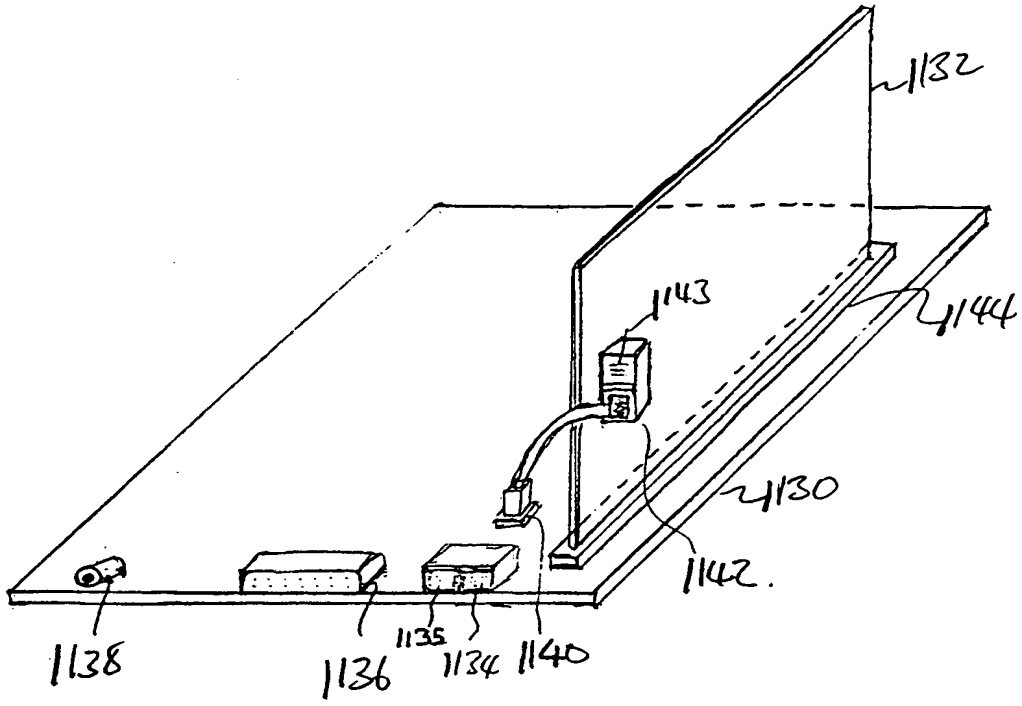


Fig 19d

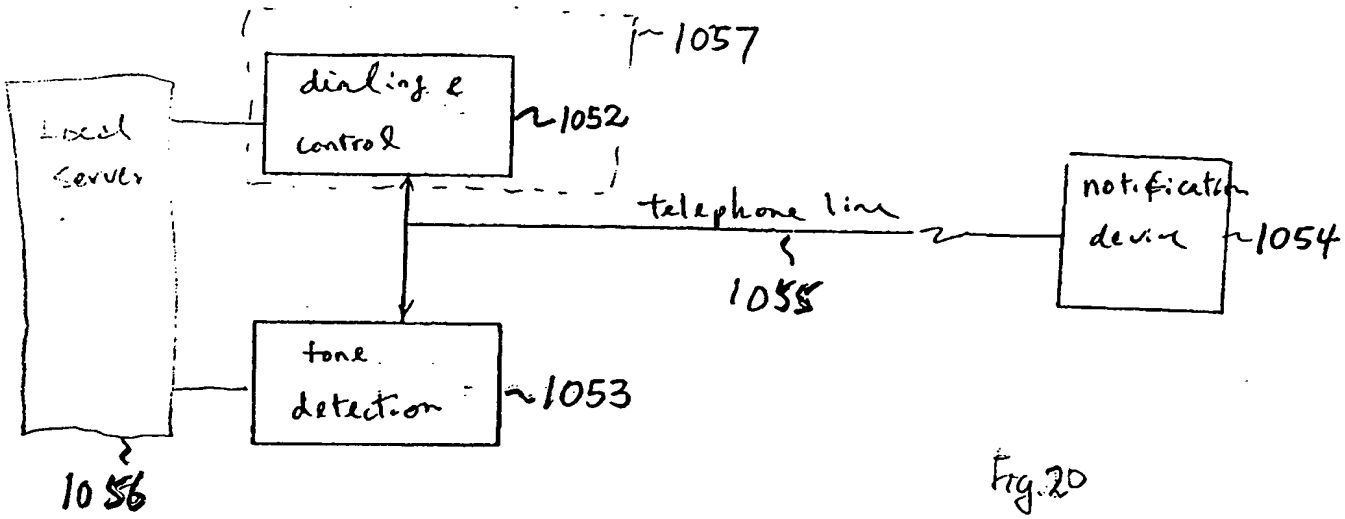


Fig. 20

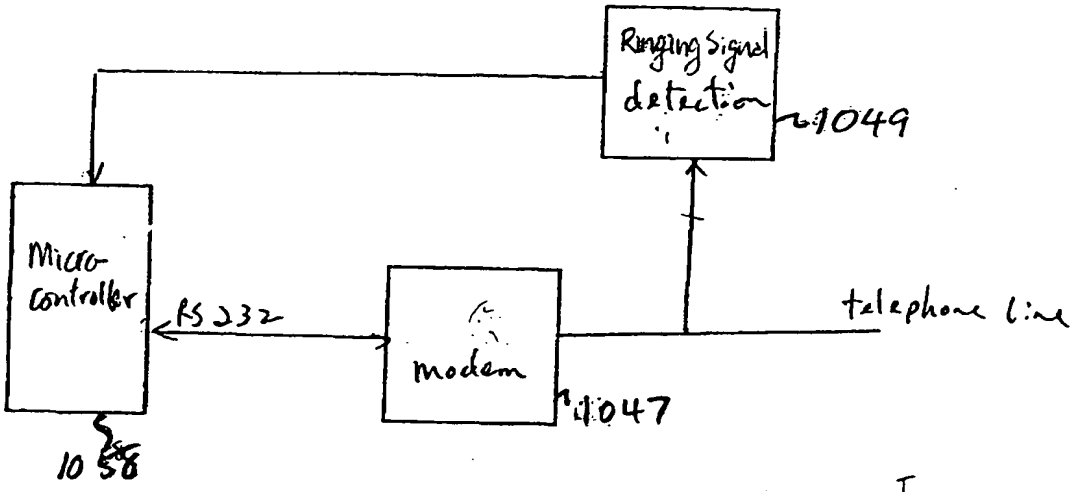


Fig. 21

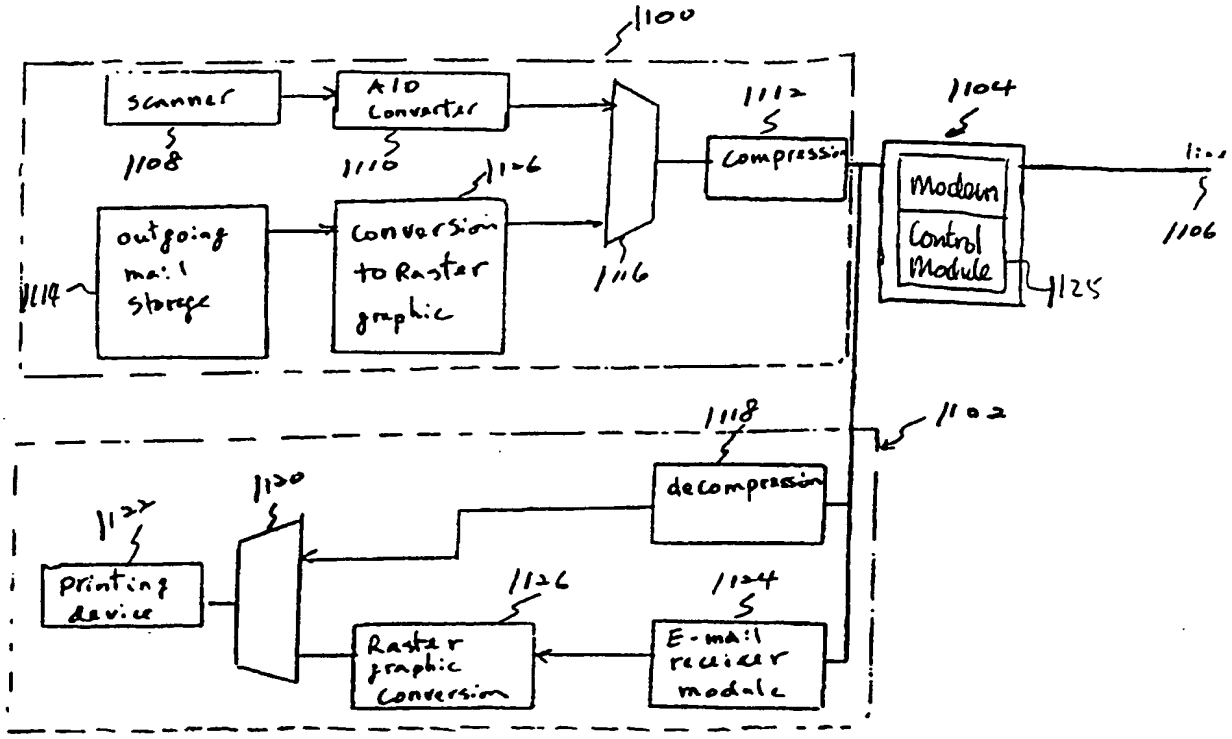


Fig. 22

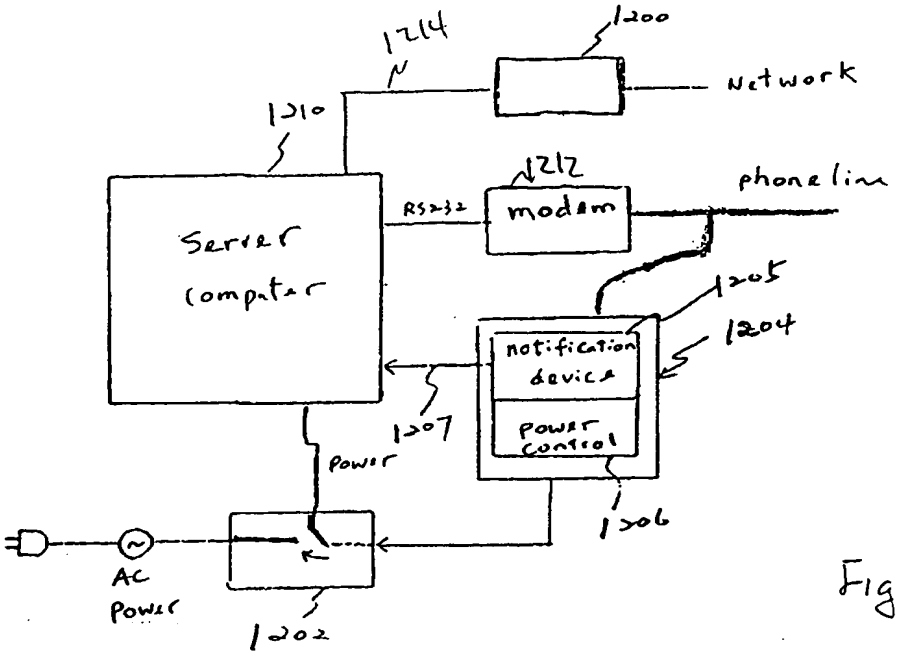


Fig. 23

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/11076

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04M 11/00
US CL :379/96

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/96,90,94,97-99,110,67,88,89,142. 348/6,7,14. 370/61.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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| X | US, A, 4,837,797 (FREENY, JR.) 06 June 1989, see abstract, all figures. | 1-27 |

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| Name and mailing address of the ISA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231 | Authorized officer<br>WING F. CHAN |
| Facsimile No. (703) 305-3230 | Telephone No. (703) 305-4750 |

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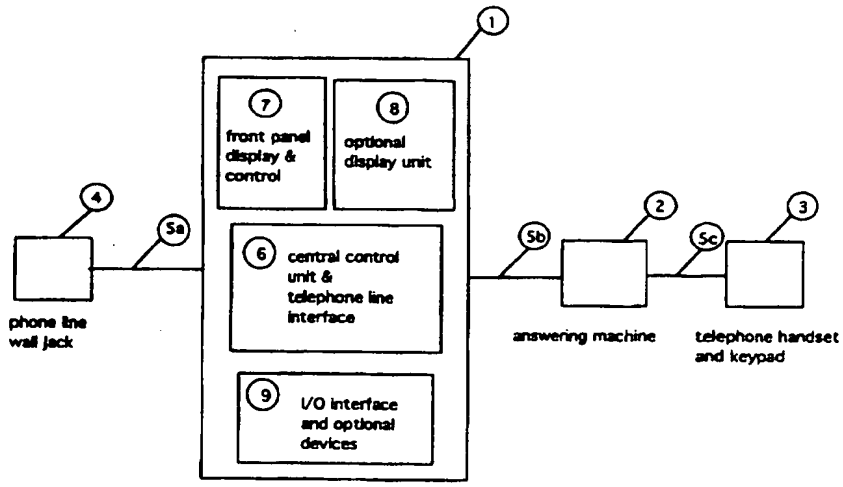
(74) Agents: HAMRICK, Claude, A., S. et al.; Bronson, Bronson & McKinnon L.L.P., Suite 600, Ten Almaden Boulevard, San Jose, CA 95113 (US).

(54) Title: EVER READY TELEPHONIC ANSWERING MACHINE FOR RECEIVING AND DELIVERING ELECTRONIC MESSAGES




connection of E-mail apparatus and telephone & answering machine

(57) Abstract

The present invention discloses a telephonic E-mail "answering machine" (1) for receiving, processing and storing electronic messages. The E-mail answering machine (1) includes a phone jack (4) for adapting to an existing telephone line for receiving electronic messages from the phone line. The telephonic apparatus further includes a processor (6) for responding to the electronic messages and for storing the messages in the answering machine (1). In another preferred embodiment, the telephonic E-mail answering machine (1) further includes an LCD display (8) for providing information to a user relating to a reception of the electronic messages.

* (Referred to in PCT Gazette No. 20/1997, Section II)

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# EVER READY TELEPHONIC ANSWERING-MACHINE FOR RECEIVING AND DELIVERING ELECTRONIC MESSAGES

## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention is generally related to systems for facilitating electronic messages over interconnected computer networks, and more particularly, a system for coordinating and delivering electronic mail messages directly to a novel device for sending and receiving electronic mail messages.

### Description of the Prior Art

Even with rapid increase in the use of personal computers and computer networks, the benefits of electronic communications in the forms of electronic data (or messages) representing texts, images and sounds are still limited to very small percentage of the population. To the majority of people, the information highway is still too remote. In order to get on the 'ramp' of the information highway, more sophisticate processes are required which may involve the use of computer and modem to 'log on' a local server, setting up an account, executing communications programs, sending and receiving messages, and download and upload files. To people in most households, even with a computer and a modem, these tasks are too complicate and not sufficiently 'user friendly'. Even if the technology and the systems are available, there are still many hurdles to overcome before most people can switch to an E-Mail communication mode. Ordinary people are not yet able to take advantage of the existing telephone systems and micro-processors or computers to routinely communicate with 'electronic mail' (E-Mail) for sending and receiving electronic messages.

The telephone system has been greatly enhanced and become a widely accepted communication apparatus in

households and offices since its invention. The examples include the telephone answering system found in households, the voice mail system used in office environments. The telephone answering system, including a tape recorder and some control circuits, provides a very affordable and easy-to-use telephone apparatus. It answers the incoming phone call by taking a series of steps. It performs an off-hook operation to simulate the action of human-being picking up a handset Then, it starts the communication by making an announcement and takes the message from the caller by recording the message on an audio tape. when it finishes, it hangs up and sets the incoming message indicator, such as blinking a LED. The party being called can look at the indicator and knows immediately how many messages are on the machine. To retrieve the message, all it takes is to push one button. The regular tape recorder functions, such as STOP, PLAY, FAST FORWARD and REWIND, are available to the telephone answering system. The system has been so widely accepted that many manufacturers have integrated the answering/recording functions within a telephone apparatus. The voice mail system takes a step further. It creates individual voice-mail box for everyone on the list. It allows the sharing of one telephone answering system but still keeps the privacy of the individual.

While voice communication through the telephone becomes part of our daily lives, the widely used computer has created another format of communication-data communication, One of them is electronic mail, or E-mail. The electronic mail may contain text, image and digitized voice It provides a great alternative of communication among people. Through computer network system, one person can send a mail to another person anywhere in the world as long as the addressee has a computer connected to the same network The increasing popularity of the global computer network the Internet, has made the E-mail more useful than ever.

These two important ways of communication by the

use of telephone and computer networks have worked very well in voice and data communication respectively. More sophisticate computer users are able to use computer with modem to conned with existing telephone networks to manage both data and voice communication, However, since the telephone lines can only be used on a 'dedicated' basis. Voice or data communication is totally blocked for a segment of time when that line is occupied in connecting by modem to computer networks or when two people are talking using' the phone. Because of the nature of operation, an electronic message, which has arrived at a server station, has to wait until a user logs on thus much useful time is wasted. This passive nature of E-mail delivery thus generates waste of useful resources and time when the messages are idle waiting to be retrieved.

There are some attempts to integrate a plurality of media communication in office environment Some representative examples are U.S. Pat No.5,333,266, entitled METHOD AND APPARATUS FOR MESSAGE HANDLING IN COMPUTER SYSTEMS, issued to Boaz et al. on Jul.26, 1994 and U.S. Pat No. 5,349,636, entitled INTERFACE SYSTEM AND METHOD FOR INTERCONNECTING A VOICE MESSAGE SYSTEM AND AN INTERACTIVE VOICE RESPONSE SYSTEM, issued to Irribarren on Sept.20, 1994. Both rely on a powerful computer and a local area network to integrate multiple message systems. They were designed for office use not suitable for households or small offices. Another example is U.S. Pat 5,193,110, entitled INTEGRATED SERVICES PLATFORM FOR TELEPHONE COMMUNICATION SYSTEM. It is specifically designed for use in the central office of telephone company or in a large corporate office. These inventions do not provide a solution to the difficulties that higher skill level of computer are required for E-Mail communication, Regular daily use of E-Mail communication in homes, college dormitories and small offices are still not so convenient for most people.

Popular and routine use of E-Mail communications

are still hindered by current requirements of equipment and network configurations. First, the E-mail is limited to those who have access to computers or terminal devices connected to a host computer capable of process E-mail. This may not be a problem in modem offices equipped with computers and networks for connecting to host computers or network severs. But it becomes a significant limiting factor for households and offices without the modem equipment or connecting networks. Secondly, the actual reception of the electronic messages can only be performed when the receiving computers, i.e., terminals for communication, are connected to E-mail server. The usefulness of E-mail is greatly limited in terms of timelines of the messages. In order to assure that no important messages are missed, a user has to log on to the network in a routine manner to 'check the mail' regularly. It may becomes burdensome during some inconvenient time. In order to resolve this difficulty, Clercq discloses in a U.S. Pat 5,138,653, entitled SYSTEM FOR AUTOMATIC NOTIFICATION OF THE RECEIPT OF MESSAGES IN AN ELECTRONIC MAIL SYSTEM (issued on Aug. it 1992), an E-mail system for making a call to an E-mail addressee which is triggered when a message is received. An addressee is then required to retrieve the E-mail from remote station by the use of a computer. It may even be more inconvenient than a beeper' as the addressee may not be in a convenient place with access to a computer and modem to log on to a server.

Therefore, a need still exists in the art of system design and device manufacture for electronic message communication to overcome these bottlenecks and inconveniences which limit the usefulness of the E-mail. Specifically, it is desirable to provide a telephonic E-mail apparatus which provides functions similar to a phone answering machine which is ready for a user for receiving, viewing or listening to the received electronic messages in a 'plug and play' fashion. Additionally, in order to minimize any inconvenience

thus caused to a user, it is desirable to adapt the telephonic E-mail apparatus without interfering existing telephonic communication operations. A user would thus be allowed to operate a telephone or phone answering machine with the E-mail apparatus as if no E-mail apparatus had been adapted into the system. An ordinary telephone user would then be provided with a convenient E-mail apparatus ready to be adapted into a telephone system without requiring the use of a computer and applying computer skills whereby the limitations and difficulties of the prior art can be resolved.

Moreover, as more and more people have access to computers providing for electronic mail messaging capabilities via the internet or internal networks, electronic mail messages, commonly referred to as e-mail messages, are becoming an integral part of modern communication. The delivery of an e-mail message occurs virtually instantaneously and the recipient of an e-mail message can reply to the message within minutes of the receipt.

However, for the situation where a user is connected via a phone line to the network, special problems exist. In this scenario, e-mail communication requires certain hardware and software combination in order for the user to send and receive e-mail messages. Generally speaking, for connection to the internet via a phone line to a network server, the necessary hardware includes a computer and a communication device such as a modem. Software wise, a mail program for the sending and receiving of e-mail messages is needed. Additionally, there may be a monthly subscriber charge for connect time to the server imposed by a internet service provider if the user is not connected via a prepaid network. Overall, economically speaking, it can be a significant investment to have a computer set up for the sending and receiving of e-mail messages. Moreover, the necessary hardware and software are fairly complex and may be difficult to set up by a novice user. These barriers bar majority of people from communicating

with e-mail messages.

Even if a user has a complete computer system setup for the sending and receiving of e-mail messages, there are problems with receiving the messages in a timely manner, with power consumption, and with security risks.

In order to receive e-mail messages in a timely manner, a user must either manually and periodically dial into a network server or program the computer to automatically and periodically dial into the server to check and retrieve new mail messages. The manual method is a time consuming and tedious process that distracts the user from productive use of his or her time. The automatic method requires that the computer be left on all of the time which wastes power and may incur telephone toll charges every time the computer calls the server. If the network server is programmed to call and deliver a new message to the user's computer upon receiving it, the user's computer must be left on all the time which again wastes power.

Moreover, whenever a computer is left on, there is a risk of security breach where there might be unauthorized access to the computer via either the phone line or from the keyboard by an unauthorized person and thereby compromising the user's computer system.

All in all, the above described factors prevents e-mail messages from being delivered to every household. Thus, a new e-mail system and a low cost device are needed to provide an universal e-mail messaging system capable of sending and receiving e-mail messages from and to every household.

## SUMMARY OF THE PRESENT INVENTION

It is therefore an object of the present invention to provide an apparatus and a new communication system architect and process ready for implementation on existing telephone system to overcome the aforementioned difficulties encountered in the prior art.

Specifically, it is an object of the present invention to provide an apparatus ready to adapt to an

existing telephone system in a 'plug-and-play' manner to receive and delivery electronic messages including text, images, and digitized voice signals whereby every household with a telephone can easily access to and be benefited by electronic messages without requiring more complicate processes of employing computer and modem and managing the execution of communication programs before such messages can be exchanged thereon.

Another object of the present invention is to provide a telephonic electronic message 'answering machine' which is equipped with user friendly features similar to a convention answering machine without interfering with existing telephone functions such that every regular house can apply such an apparatus immediately.

Another object of the present invention is to provide an electronic message apparatus which stores initial registration and subsequent logon information therein to automatically dial up several local servers directly, subject to user selection, to perform the initial registration and subsequent logon functions such that more complex functions of registration and logging on to a server can be managed automatically.

Another object of the present invention is to provide an electronic message apparatus which can coordinate with a server to perform message screening and message prioritizing functions such that a user can pre-arrange to receive or screen types of messages according to the importance of such messages.

Yet another object of the present invention is to provide a method and apparatus for facilitating, sending, and receiving of e-mail messages through interconnected computer networks or telephone networks.

A further object of the present invention is to provide a low cost method and apparatus for transmitting and receiving e-mail messages.

Yet another object of the present invention is to provide a low cost method and apparatus for delivering e-mail messages incurring minimum telephone toll

charges.

Briefly, in a preferred embodiment, the present invention includes a telephonic apparatus for processing electronic messages which includes a means for adapting to an existing telephone line for receiving electronic messages including digitized signals. The telephonic apparatus further includes a processing means for responding to the electronic messages and for storing the messages therein. In another preferred embodiment, the telephonic apparatus further includes an user interface means for providing information to an user relating to a reception of the electronic messages.

In another embodiment, a system for facilitating, sending and receiving e-mail messages is disclosed. This e-mail system is supported by one or more main servers and a plurality of regional servers geographically distributed in populated areas, and are interconnected via a computer network such as the internet. An incoming e-mail message under this system is first processed and packaged by the main server to allow tracking of this message. The packaged message is then sent to the designated local server via a regional server. The local server receives the e-mail message and notifies or delivers the message to a client (user) e-mail device through one of several available methods. These methods include direct mail delivery, call-back mail delivery, and notify-only. Under the notify-only method, the local server uses an optional ringing protocol to notify the e-mail device that there is a mail message waiting. Under the call-back delivery method, the local server uses the optional ringing protocol to notify the e-mail device, and the e-mail device then calls the local server to retrieve the message. Under the direct-delivery method, the local server calls the e-mail device and delivers the message. The e-mail device is a novel device designed to send and receive e-mail messages. It is a low cost device that may be a stand-alone device, a part of a multi-function device, or a part of a computer expansion card. The

servers of the present invention can be maintained and operated remotely.

An advantage of the present invention is that it provides a method and apparatus for facilitating, sending, and receiving e-mail messages through interconnected computer networks and/or telephone networks.

Another advantage of the present invention is that it provides a low cost method and apparatus for transmitting and receiving e-mail messages.

Yet another advantage of the present invention is that it provides a low cost method and apparatus for delivering e-mail messages while minimizing telephone toll charges.

These and other objects and advantages of the present invention will no doubt become obvious to those of ordinary skill in the art after having read the following detailed description of the preferred embodiments.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram showing how the present invention of the E-mail apparatus connects with the existing telephone answering system.

Fig. 2 is a block diagram of the present invention of E-mail capable telephone apparatus.

Figs. 2a, 2b, 2c, 2d are preferred embodiments of communication systems which incorporate an E-mail apparatus of the present invention.

Fig. 4 is an implementation example of a basic front control panel of the apparatus.

Fig. 5 is an example of more complicated or non-frequently used functions menu of the apparatus.

Fig. 6 is a flow diagram of the easy registration process.

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Fig. 7 is a flow diagram of a typical E-mail collecting process.

Fig. 8 is a flow diagram of an E-mail receiving

process.

Fig. 9 is a flow diagram of the E-mail delivery process on the E-mail sever.

Fig. 10 is the overall network connection diagram. It shows how the E-mail ready telephone communicates with the server and the rest of the world.

Fig. 11 illustrates a conceptual representation of the internet, a number of servers connected to the internet, and a number of computers connected to each server;

Fig. 12 illustrates a conceptual representation of the e-mail system of the present invention utilizing the internet, servers, and e-mail devices;

Fig. 13 shows a hierarchial relationship between the main server, regional servers, and local servers;

Fig. 14 shows another hierarchial relationship between the main server, regional servers, and local servers where the local servers may be connected directly to the main server;

Fig. 15 illustrates the steps for registering an e-mail device;

Figs. 16a-16d show the pseudo code for the procedures residing on the main server for facilitating incoming and outgoing e-mail messages;

Figs 17a-17h show the pseudo code for the procedures residing on the local server for interacting with the main server and the e-mail device;

Fig. 18a shows a computer expansion card implementation of the e-mail device;

Fig. 18b-18c illustrate the pseudo-code for the software residing on the computer system for operating the e-mail expansion card;

Fig. 19a-19d show other computer expansion card implementations of the e-mail device used in conjunction with a fax/modem;

Fig. 20 illustrates a block diagram of the components in implementing the ringing protocol on the local server side;

Fig. 21 illustrates a block diagram of the

components in implementing the ringing protocol on the e-mail device side; and

Fig. 22 illustrates a block diagram of an integration of a faxing device and the e-mail device.

Fig. 23 illustrates a configuration for remote-controlling a server computer using the ringing protocol of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig. 1, the block diagram shows how the present invention of the E-mail apparatus connects to the telephone and the answering system. A twisted-pair of telephone line 5a connects the phone jack 4 on the wall to the "line" connector on the E-mail apparatus 1. Another telephone wire 6 connects the "phone" connector on apparatus 1 to the answering system 2. Then the answering system 2 connects to the telephone (handset and keypad) through line 5c. if there is no answering machine, line 5b connects to the telephone directly. Every incoming phone call will be taken by the E-mail apparatus first. If it is not for E-mail, it will pass the call to the answering system. It is important to maintain the same functionality of the existing telephone answering system when the apparatus is added to the telephone/answering system. It will be clear when we explain the inside of the apparatus 1. In Fig 1. it shows that the apparatus has 4 major building blocks: central control & telephone line interface unit 6, front panel display and control 7, optional display unit 8, I/O interface and other devices 9. Only the central control & telephone line interface unit 6 is needed for every apparatus. The others may have many different combinations.

Fig. 2 is the internal detailed diagram of the E-mail apparatus. Processor 11 reads the codes stored in ROM 12 and performs its duty according to the request from the user. For example, if the auto-collect is set up, processor 11 will receive an interrupt signal from interrupt controller 17. The interrupt will be serviced

by processor 11 to set up modem 23 through universal I/O bus 20 and dial the designated E-mail server to collect the E-mail. By using an universal I/O bus 20, it makes the architecture flexible to add or reduce its functions. Block 14 contains logic to interface system bus and I/O bus. Blocks 11-20 constitute the basic central control unit Blocks 21-23 belong to the telephone interface unit The basic control and display unit has blocks 25 and 26. Block 28 is the display for mail reading and block 27 is the controller for block 28. There are two displays in Fig. 2 The small display in 26 is used for control and status information. To display mail, a bigger display 28 is more suitable. If display 28 is built-in, display 26 can be eliminated. If the user relies on data export function to move E-mail files to his computer and to read the mail there, display 26 alone will be enough. Display 28 can be a LCD, monitor or a TV, and display control 27 will be a compatible controller. RAM 12 is a device used as a scratch pad for processor during the execution of the codes from ROM 12 ROM 12 can be a flash memory. Processor 11, ROM 12, RAM 13 and I/O bus controller 14 are connected to system bus 15. I/O bus controller allows the processor to communicate with all the other I/O devices. Real time dock 19 keeps track of the time. Timer 18 and interrupt controller 17 are used for program flow control. Clock and power management 16 is used to save the power consumption of the apparatus. when power consumption is not a concern, block 16 can be as simple as a dock chip. Processor 11 responds to the user request from front panel control 26 through panel interface block 25. It also uses panel interface block 25 to display other information to user. UART 22 is a serial communication block, it is used to move data between the E-mail apparatus and the external world. Through the modem and telephone line, it connects the apparatus to other communication devices. With a local Rs-232 or infra-red link, it can import/export data to/from a computer, digital organizer or printer.

Display control 27 is to display the mail on a display device 28. Some desirable devices such as secondary storage device 21, audio device 29 are optional add-ons. If a reasonable size of flash device is used as storage, block 21 will not be important Telephone interface block 24 controls the interface with telephone line, telephone answering system and modem. The details of block 14 are shown in the diagram of Fig 3.

There are many electronics devices available to implement Fig 2. Here is one example. Use the single chip platform VG-230 from Vadem (San Jose, California) for blocks 11, 15, 16-19, 20, 22, 27 in Fig. 2. This chip has processor, memory controller, I/O bus and many I/O peripheral devices integrated into a single chip. Modem (block 23) can be the single-chip modem SSI 73K321L from Silicon Systems (Tustin, California).

Figs. 2a - 2d are preferred embodiments showing some of the possible combinations of the modules. Fig. 2a uses TV as a primary display of mail. Block 28 in Fig. 2 is replaced with a television 28a. Flash memory 12a is used for codes and mail storage space. This is one of the simple implementations. Fig. 2b is suitable for people who have access to the computer. It is comprised of a floppy controller and drive. The mail is save on a floppy diskette. The user can take diskette to a computer and read mail there. Block 25 can be simplified since there is no need to control the display of mail. This is an example of how to count on data export function to reduce the configuration of the apparatus. Fig. 2c is another example of data export function except using different means of moving data is used. It uses Infra-red link o move data to/from the computer. In both cases, outgoing mail can also be imported from diskette or infra-red-link. Fig. 2d is an example with extensive functions. It contains removable flash memory card 26b using industry standard PCMCIA interface to save mail. It has a built-in LCD display 28b for reading mail. An audio device 29a will generate voice if the incoming mail contains a digitized voice

file.

Fig. 3 is the diagram showing internal block of the telephone interface function. When the system is in idle state (i.e. no incoming phone call), line switch 31 is set to telephone line 35 and interface control 34 and line 39 is open. When there is an incoming phone call, the telephone line interface control 34 will generate an off-hook to the caller and then monitor line 35 to see if it is an E-mail communication from line 38. If it is not, interface control 34 triggers a ring through the ring control 32 and lines 40, 41 and 42 to the telephone answering system. When handset/keypad interface block 33 detects off-hook signals on line 37 from the telephone answering system, line switch 31 turns the switch to line 39. Then the telephone is in control. The E-mail apparatus gives up communication to the telephone/answering system. This is a very important process for maintaining the function of telephone answering system function as if the E-mail apparatus is absent. In the case of E-mail communication, line switch 31 keeps the phone line connected to 35 all the time. Handset and keypad interface block 33 also becomes active when the keypad is used to control the E-mail apparatus or to edit an outgoing mail. The keypad information will be passed to the processor to respond.

Fig. 4 is an example to show the concept of the easy-to-use interface. Block 51 is a simple display panel. Blocks 52-57 are control buttons. Button 58 is a control button and an indicator. A blinking indicator 58 means an incoming mail is ready for retrieval. The user can push button 54 to read the mail. At every push of button 54, a full page of mail would be displayed to fit into the size of the display. Push button 55 to jump to the next mail. Button 53 is to display the previous page. Pushing button 52 to jump to the beginning of the previous mail. Pushing button 52 longer means back to.the beginning of the first mail and the mail will be overwritten when the next batch of mail arrives. Pushing button 58 will dial, send and collect mail. When it is

done, a message will be displayed on block 1 and call indicator 8 will be blinking. Button 56 is used to interrupt the E-mail communication when the user needs to use the telephone. Button 57 is a special function button. It provides more complicated or unusual functions. It brings a menu of functions for the user to select. The functions may include registration, mail forward, and mail hold request The list in Fig. 5 is an example for those functions. The concept of separating all the basic and frequently-used functions from the complicated and infrequently-used functions by different interfaces makes the E-mail apparatus a user-friendly device while maintaining some advanced functions.

Fig. 5 exemplifies a list of the menu of more complicated and infrequently-used functions. Function 1 is a guided registration process function. Function 2 is to set the current time. Function 3 is to set the programmable secret code. Function 4 is to change the number to dial other than the designated E-mail server. Function 5 is to request E-mail server to hold the mail. Function 6 is to request the forwarding of the mail. Function 7 is to set up the daily auto-dial and connect time with the E-mail server. Function 8 is for data import/export. Function 9 is to display your e-mail address. Function 10 is to request the change of E-mail address if you don't like the assigned address after registration. Function 11 is to run diagnostics on the unit By pushing button 57 in Fig. 5, the menu of functions will be on the display 51 in Fig. 4. Every push will display next function. Button 58 is used to select the function. When the function is selected, the software in apparatus will guide user through the process. If the unit has a bigger LCD display built-in, it may display all the function at once, and the user can move the courser around the menu to select the function.

Whenever the apparatus does not detect any action from the user for an extended period of time, such as 10 minutes, it aborts all the incomplete process and resets

to the idle state.

Therefore, the present invention discloses a telephonic apparatus for processing electronic messages which includes a means for adapting to an existing telephone line for receiving electronic messages. The telephonic apparatus further includes a processing means for responding to the electronic messages and for storing the messages therein. In another preferred embodiment, the telephonic apparatus further includes an user interface means for providing information to an user relating to a reception of the electronic messages.

Fig. 6 is the flow chart of a typical registration process. The user only needs to push a few buttons (step 101 in the diagram) and enter the phone number (step 103). The process will automatically take place by doing steps 104-111 and an E-mail address will be assigned and displayed (step 108). Step 111 is to search the phone number of the best E-mail server for the user to dial in based on user's phone number and save the number in the apparatus.

There are two ways to communicate between an E-mail apparatus and its server. One way is auto-connect, the other is the conventional logon process. when the E-mail apparatus initiates a call to the server, the server will try to auto-connect first It is an automatic process and requires no user attendance. The first requirement for the auto-connect is that the server knows the user's E-mail address and the machine ID of the E-mail apparatus. The second requirement is that the server and the E-mail apparatus have the same derived password. The derived password is a code generated by an equation based on the P code (programmable code), the user's phone number and the machine ID. In order to do transaction, both need to share the same equation. Checking the machine ID and the derived password, the server can determine the legitimacy of the request from the E-mail apparatus. The auto-connect provides the convenience of automatic downloading mail. But if the checking fails, the server will ask the user to enter

the password. This is the case when a different machine is used to download mail, the E-mail apparatus has a different machine ID. The server will not use auto-connect, and a conventional logon process is required to access for security reasons.

In the case of a server initiating the call to an E-mail apparatus, the auto-connect is the only way to communicate and get/give access. In other words, only the designated server can deliver mail to the designated E-mail apparatus. This is to provide security and convenience. if the user gets a new E-mail apparatus, a change of registration is required to get the auto-connect function.

The following is a detailed process of the access legitimacy checking in the auto-connect mode. First, the apparatus sends its unique serial number (i.e. machine D) to the E-mail sever. Secondly, the apparatus sends its E-mail address to the server. if these two do not match, the server will ask the user to enter the password and the conventional logon process takes place. Otherwise, the E-mail apparatus will proceed to send its programmable code or P code and the derived password to the server. The derived password is generated from the machine ID, P code and user's phone number. It is sent to the server and compared against the derived password from the server. If the server checks and finds it correct the access is authorized. The programmable code or P code to the E-mail sever is used as an instruction to screen the incoming mail and to generate a derived password.

Fig 7. is the flow diagram to show how the apparatus connects to the E-mail server, sends the outgoing mail and receives the incoming mail. It can be performed on a predetermined time daily (which starts from step 122 in the diagram) or upon the request from the user (which starts from step 121 in the diagram). Steps 127, 129 and 130 are where security and screening processes take place. Steps 134-138 are designed to

prevent the overflow of incoming mail and protect the integrity of the received mail. The details are explained later.

Fig 8. is the flow diagram of how an E-mail apparatus responds to a request from the server. whenever there is an incoming call, the apparatus will do "off-hook" (step 142) and check if it is an E-mail request (step 143). if it is not, the call will be directed to regular voice communication as steps 144-146. Otherwise, it proceeds to step 147. If the machine ID and derived password checking passes, the transaction starts. if it fails, the call is terminated. Step 148 is an option. It will inform the addressee of a potential problem on the mail delivery. The mail transfer transaction can process the outgoing mail (step 149) and check if the total mail size fits into the E-mail apparatus. if not, only parts (extracted) of the mail are delivered (step 153). Before terminating the process, the incoming mail indicator is updated (step 155).

The following is the detailed description on how the E-mail server screens the incoming mail. It includes sorting, extracting and repackaging before the delivery of the mail.

The present invention uses the extension of the E-mail address and the programmable codes or P code received from the apparatus to determine the importance of the incoming mail. The E-mail address is based on the naming convention on the Internet, called Domain Name System (DNS), with additional field. The DNS has the general format as:

<someone>@[subdomain].[subdomain].[...].<domain>

where the <...> represents required elements and [...] is optional portion. A typical example looks like: jsmith@sales.abc.com for John Smith in the sales department of ABC corporation "jsmith" is the account name for John Smith. It is assigned to him by the system administrator of the host computer. Usually, it is the logon name used to access the host computer. And abc.com

is the name of the host computer connected to the Internet network There is governing body for the host name assignment The name will be translated into 'P address and recognized by the peer on the network Hence a mail from bigbird@xyz.com can be delivered to abc.com host computer through the global network, internet. When the host computer named abc.com receives the mail, it knows its subdomain, sales. It sends the mail to the internal E-mail server in sales department of ABC corporation. When John Smith logons the computer, he will be notified of the arrival of the E-mail.

The present invention uses some extensions on top of the DNS to provide some enhancements. The new extended E-mail address for jsmith@sales.abc.com become jsmith[.<specialcodes>]@sales.abc.com. The general format becomes:

<<someone>.[specialcodes][ClassofMail]@[subdomain].[...].<dom ain>

One example looks like:jsmith.4567ER@sales.abc.com. Here "4567" is used to compare with the P code on the apparatus. The result of the comparison determines the importance of the incoming mail. An incoming mail with special codes completely matching the P code will get the highest priority. A mail with partially matched codes will gain some attention based on how close the address extension codes compare with the security code. In the above examples, "E" indicates the mail is Express mail, so it will be delivered in a more timely fashion. The "R" indicates the mail is registered. It requires a return receipt when the mail is delivered successfully. A mail without the special codes on the E-mail address will be treated by the E-mail server as a regular bulk mail.

Since the E-mail ready telephone apparatus is likely to be a small special-purpose device, the relatively limited capacity requires more careful management The P code provides a very simple way to sort the incoming mail and prevent the flooding of the junk mail. But, even with the screening feature, the unexpected volume of incoming mail may still cause mail

box overflow. The mail repackaging function on the server will prevent this from happening. It works as follows.

After the legitimacy checking, the E-mail server gets the information of available storage on the E-mail apparatus and decides what to send. If the total size of the incoming mail exceeds the available storage space on the apparatus, the E-mail server extracts the incoming mail and "repackages" the E-mail and sends it to the apparatus. The extracting process may reduce the mail size by taking the whole content of high priority mail but only the subject, name of sender from the lower priority mail. It may use a complicated method to achieve the best result from extracted mail. The protocol puts the intelligence and complexity to the E-mail server but keeps the E-mail apparatus simple. It is an important concept in the present invention.

Fig 9. is the flow diagram of how an E-mail server processes the mail. Step 166 actually is a two-step process as explained before in Fig. 7. Step 170 sending the outgoing mail and steps 171-172 checking and sorting incoming mail can be done in parallel. Different class of mail may take different steps as shown in step 163 (for express mail) and step 176 (registered mail). This flow diagram exemplifies how a mail is processed.

Fig. 10 exemplifies the overall network connection. The E-mail ready telephone 200 connects to its local E-mail server 202 through the existing telephone network 201. Usually, the local E-mail server 202 connects to the host computer 204 with a LAN (local area network) 203. A global network 205 links the host computer 204 and 206 together. The network 205 usually is a WAN (wide-area network). Computers 208,209,210 and the host computer 206 are connected by a LAN 207. A user can send an E-mail from computer 208 to an addressee of the E--mail ready telephone system 200. The E-mail will travel to the host computer 206 through the LAN 207. The host computer 206 serves as a gateway to the global network 205. The mail will be passed to the WAN 205. It may

travel through several host computers before reaching the host computer 204 which has the correct domain name of the E-mail address. Then the host computer 204 will look at the E-mail address or the sub-domain name and send the mail to Local server 202 through Local server 203. The mail will stay in the server and the process of Fig. 9 takes place. The server will deliver the mail either by dialing the addressee's phone number or by just waiting for the request from E-mail ready telephone. Those are the process flows in Figs. 7 and 8. All the communication process, including legitimacy checking, mail size checking and mail transfer, taken place between the server and the E-mail ready apparatus are through the telephone network 201. when the E-mail apparatus initiates the connection, as described in the process flow of Fig. 7, the server will check if it is the right machine before giving the mail. If the machine ID checking fails, the user has to enter the password to gain access. If the server initiates the call to the E-mail apparatus and finds the incorrect machine ID, mail won't be delivered. But the E-mail apparatus will signifies the addressee of the failed attempt In any case, the server has to request the information of the available storage space on the E-mail apparatus before sending the mail. It may be necessary for the server to determine the priority of the mail based on the p code and extract partial information for delivery. In other words, it is server's responsibility to deliver the proper size of mail to the apparatus.

## DETAILED DESCRIPTION OF A SECOND EMBODIMENT

Referring to Fig. 11, the network infrastructure (for a network such as the internet) 1014 is comprised of a number of interconnected servers 1012 communicating with each other using a common protocol (such as TCP/IP). A user may communicate to another user by using a computer 1010 that is connected to a server that has a point of presence on the network. The user may then send a mail message to another user having an

address at a computer connected to another server. Under this paradigm, computers are needed at both ends of the communication link and the costs for the computers may be quite high. Additionally, local area network (LAN) is used extensively in the corporate environment to connect the user's computer to the mail server. The LAN allow the user's computer to communicate to mail server in real time which acts like a local post office in the e-mail world. Real time communication between the user computer and the server allows e-mail messages be sent and received in a timely manner. However, LAN or any existing real time network is expensive and difficult to install for small businesses and households. In these situations, a phone line (voice or ISDN) is used for most people to communicate with the mail server from their home computers. This approach reduces the cost at the price of real time connection. Without real time communication, the communication efficiency and convenience is greatly reduced.

Referring to Fig. 12, an e-mail messaging system of the present invention utilizing the existing internet infrastructure is presented. The user can use a low cost e-mail messaging device 1018 to communicate with a mail server 1016 or another e-mail messaging device 1018. The device in accordance with one embodiment of the present invention is simply a low cost stand alone device capable of receiving a notification that one or more e-mail messages have been received at the local server 1016 waiting for retrieval. The device also is capable of identifying an incoming signal as an e-mail message signal, receives the incoming e-mail messages and stores them. Moreover, the device can provide the needed functional components for the user to compose an e-mail message and deliver the e-mail message to the local server or another e-mail device directly. The e-mail device uses minimum set of electronic components and consumes very low power when compared to the power consumption of a computer. It can be left on like an

answer machine. There are also other possible embodiments of the e-mail device.

Fig. 13 illustrates the preferred hierarchy for the e-mail messaging system. At the top level, there is a main server 1020 receiving e-mail messages from the internet network and sending e-mail messages originated from the client e-mail devices to the network. The main server may be one or more computers sharing a centralized database. The main server 1020 distributes and receives e-mail messages from a number of regional servers 1022. Each regional server 1022 is designated to serve a particular geographical area and serves one or more local servers 1024. The local servers 1024 interact with the client e-mail devices 1026 within its geographical area. The client device is designated to be a simple, low-cost electronic device suitable for home or business use, and it is further described infra.

To illustrate the message flow, the main server 1020 receives an e-mail message, identifies the e-mail address, determines the regional server 1022 for this e-mail message, and sends it to the corresponding regional server 1022. The regional server may be designated to serve a city or a greater metropolitan area involving several area codes. After it receives a message, it forwards the message to the local server. A local server is designated for each sub-region and directly serves the clients and their e-mail devices. Implementation wise, a regional server and a local server may be logically separate systems residing on the same physical machine. Each local server is equipped with the necessary hardware and software to communicate with clients' e-mail devices.

In an alternate embodiment, referring to Fig. 14, the main server 1020 may communicate directly with local servers to send and receive e-mail messages to and from the client e-mail devices.

Although the illustrated embodiments show a hierarchial structure, it is within the scope of the present invention to implement the present invention in

a distributive structure.

In order to provide direct e-mail messages to each client, each client is identified by an unique e-mail address, and must be registered with the e-mail system in order for the e-mail system to interact with the e-mail device. Typically, the e-mail device is accessed via a local telephone line such as a voice, data or ISDN line.

Fig. 15 illustrates the steps for the registration process where an e-mail device (as operated by the client) dials a toll-free number, logs on the main server, and the main server performs the illustrated steps. First, the main server requests and obtains the machine identification number unique to the particular e-mail device. The machine identification number identifies the device type and also provides for theft prevention. Secondly, the main server gets the security code (password) entered by the user. The use of a security code minimizes the possibility that the mail messages being delivered or received by the wrong party. Next, the main server fetches the notification code from the e-mail device. The notification code is an optional ringing protocol used by the main server to provide a notice to the e-mail device through the use of ring tones without incurring telephone toll charges.

The phone number for connecting to the e-mail device is provided to the main server. For the given phone number, the main server finds the corresponding local server and its phone number, and sends this phone number to the e-mail device. The e-mail device stores it in its memory for future use. Finally, the main server completes the registration process by completing and inserting a new client information entry into the centralized database.

**Main Server**

To track information on the clients, the local servers, and the regional servers, two tables are maintained by the main server. In table one, each

client's name, phone number, e-mail address, the local server for the client, and other administrative or accounting information are kept.

TABLE 1

| Client Name | E-Mail Addr | Local Server | Phone Number | Other Info. |
|---|---|---|---|---|
| John Smith | jsmith | 1 | (210) 231-1234 | |
| Bob Clinton | bclinton | 1 | (210) 231-7890 | |
| Al Goodman | agoodman | 2 | (123) 789-1234 | |
| Mike White | mwhite | 2 | (123) 789-4321 | |

Table two contains information for each local server, information such as the address of the regional server for the local server and the type of connection from the main server to the regional server.

TABLE 2

| Local Server | Regional Server Address (e-mail) | Connection Type |
|---|---|---|
| 1 | system@region1.com | Internet |
| 2 | postmaster@region2.com | (210) 111-1234 (leased line) |

For example, there are two local servers illustrated in table two. The regional server for local server one is connected to the main server via the internet, and the regional server for local server two is connected to the main server via a leased line for high speed communication. Other types of connection methods between the regional servers and the main server can be utilized as well (e.g. satellite) if they are economically feasible. Additional tables can be created and maintained as needed.

For the purpose of organizing incoming e-mail messages, a mailbox is dedicated to each client and maintained by the main server. The mailbox can be a file or any other type of indexable storage system.

Referring to Fig. 16a, the main server is

instructed to check for and process incoming and outgoing mail messages every x minutes where x is a defined period of time which can be a function of the load on the system.

Referring to Fig. 16b, the steps for processing outgoing mail messages are illustrated. Outgoing mail messages come from clients of the e-mail system for delivery to other users on the net. This process is performed every so often to ensure mail is processed in a timely manner. If there is a new mailbag from a local server, the new mailbag is decompressed, and the mail messages are extracted from the mailbag and passed to the send mail utility. The send mail utility can be a common mail program (e.g. Unix Operating System sendmail utilities) with the capability of sending and receiving e-mail messages.

Fig. 16c illustrates the steps for processing incoming mail messages where a mailbag is prepared for each local server. The local servers are indexed consecutively starting with index equals one 1030. For each local server, a new mailbag is initialized 1032. For each client serviced by the particular local server, the client's mailbox is searched, and new messages are extracted and appended to the mailbag for the particular local server 1034. The new mail messages are then deleted from the mailbox for the client 1034.

If the mailbag is not empty, the mailbag is compressed, and a confirm flag is set 1038. If the size of the mailbag after compression is greater than the maximum size allowed for mail delivery, the mailbag is split into two or more smaller mailbags. A copy of the mailbag(s) is then stored in a To-Be-Confirmed directory for later confirmation, and the mailbag(s) is sent to the regional server for the particular local server.

After all of the mailboxes for a particular local server have been processed, the process repeats until all of the local servers' mailbags have been processed.

The main server also performs a confirmation process to ensure that the mailbags and the individual

mail messages have been received. Referring to Fig. 16d, the steps for the confirmation process is illustrated. Every so many minutes, the confirmation process is executed. For each confirm flag that is set (confirm [i]=true), the main server searches for a confirmation message from the corresponding local server. If a confirmation message is found and not all the mail messages have been delivered and the elapsed time is greater than the maximum allowed elapsed time, the undelivered mail message is placed in an undelivered mail directory and the operator is notified. If the confirmation message is not found and the elapsed time has exceeded a maximum allowed elapse time, the operator is notified. If all the mail messages are confirmed as successfully delivered, the mail bag is placed into archive.

**Regional Server**

The function of the regional server is to serve as an intermediary between the main server and the local servers. The regional server is configured to have the function of an ISP Point-of-Presence (like an internet service provider) in order to receive and send mail via the internet. It maintains a shell account and a mailbox for each of the local server it serves. The regional server interacts with its local servers to facilitate the handling of incoming and outgoing mailbags. The mail utilities commonly available with the operating system (e.g. Unix) of the regional server can be utilized to achieve the tasks described.

The regional server can be configured to operate as a local server as well.

**Local Server**

Each local server maintains a table of clients. For each client, referring to Table 3, the client's name, e-mail address, phone number, notification type, ringing protocol, security code, machine ID, and other miscellaneous information are kept.

TABLE 3

| Name | E-Mail Address | Phone Number | Notification Type | Ringing Code | Security Code | Machine ID |
|---|---|---|---|---|---|---|
| John Smith | jsmith | (210) 231-1234 | notify-only | 0.5/ 0.25 | 123 | 789 |
| Bob Clinton | bclinton | (210) 231-7890 | call-back | 0.3/ 0.5 | 456 | 111 |

There are three notification/delivery types: notify-only, call-back mail delivery, and direct mail delivery. In the notify-only notification method, the local server calls the client's e-mail device using the specified ringing protocol from the table. No connection is actually made between the local server and the e-mail device. The rings are set up in such a manner that the e-mail device is programmed to recognize the ring pattern and determine that a notification is being delivered by the local server. When the notification is successfully received, the e-mail device activates an indicator light on the e-mail device. The client/user can then retrieve the message at his or her convenience using the e-mail device or other means. If in the process of notifying the e-mail device, an actual connection is made, the e-mail device can be set to call the local server to retrieve the e-mail messages or messages can be directly delivered.

In the call-back mail delivery method, similar to the notify-only method, the ringing protocol is used to notify the client's e-mail device that there is one or more e-mail messages waiting at the local server. The notification causes the e-mail device to call the local server and retrieve the e-mail messages.

In the direct mail delivery method, the local server calls the e-mail device, connects with the e-mail device, and delivers the e-mail messages to the e-mail device. The client may designate any one of the three notification methods as long as it is supported by the

e-mail device and the local server.

The optional ringing protocol is a method for the local server to provide notice to the e-mail device without incurring toll charges. It utilizes and controls the length of ring time and the length of time between rings. Using this method, a calling device (here the local server) dials the number, detects ring tone for x1 second(s), hangs up, waits for w1 second(s), dials the number again, detects ring tone for x2 second(s), and hangs up. The receiving device (here the e-mail device) upon detecting this particular ringing protocol determines that a notice is being delivered by a calling device, and accordingly executes a preprogrammed routine (if any). The ringing procedure of dial, detect, hang up, and wait is not limited by a specific number of iterations and may be repeated a number of times. In the preferred embodiment, this procedure is repeated three times, using x1, x2, x3 and w1, w2. The method may be simplified by setting w1 and w2 to have the same length of time. Other combinations are possible as well as long as the e-mail device is configured to detect and recognize the designated ringing protocol. In the preferred embodiment of the present invention, a ringing code, n/m, is used for each client where x1 is a constant, x2 equals x1+n, and x3 equals x1+n+m. Referring to Table 3, for client John Smith, a ringing code of 0.5/0.25 refers to x2 being x1+0.5 second and x3 being x1+0.5+0.25 second, where w1 and x1 are constants. Similarly, the ringing code for Bob Clinton is 0.3/0.5 which refers to x2 being x1+0.3, and x3 being x1+0.3+0.5, and w1 and x1 again being constants. Generally speaking, the ringing tone should not be very long. Note that generally speaking it is more reliable to use the difference between ring tones rather than timing the duration of each ring tone.

In utilizing the ringing protocol with communication switching devices in a central office where a switching device passes back a signal informing the calling device that the switching device is dialing

and ringing the line, once the calling device receives such a signal, the calling device can determine the length of ring time and hang up accordingly. Other implementation of the above described method can be applied to other types of calling devices and/or switching devices as well.

A security code (client password) may be set by the client to provide additional security measures. In order to protect the e-mail device itself from theft (as well as the e-mail messages) a machine identification number (serial number) particular to each machine is used. Thus, if the e-mail device is ill-gotten by another, it will not work. The machine ID also allows the local server to identify the e-mail device machine type.

In facilitating mail delivery, the local server interacts with the regional server/main server and clients' e-mail devices.

In interacting with the regional server, referring to Fig. 17a, the local server checks for one or more new mailbags from the regional server every x minutes. If a new mailbag is found, the mailbag is decompressed, mail messages are extracted from the mailbag and placed into the mailbox for the particular client.

Referring to Fig. 17b, every so often each client's mailbox is checked to see if there are any e-mail messages need to be delivered. If the mailbox for the particular client is not empty, the e-mail message(s) in the mailbox is delivered via the designated delivery/notification method for the particular client, i.e., one of the available delivery/notification methods. For each of the delivery/notification methods, there is a corresponding procedure call.

For the notify-only method, referring to Fig. 17c, the last time the local server interacted with the client's e-mail device (logon time) is fetched. If no new mail has arrived since the last logon time, the process ends. If there is one or more new e-mail messages and no notification has been sent to clients'

e-mail devices yet, the ringing protocol described above is applied. First the local server calls the client's e-mail device. If the client's phone line is busy, the local server waits a few minutes before attempting to call the e-mail device again. If the phone line is not busy, the local server, through its interfacing hardware, detects the ring tone for x1 period of time and hangs up, wait w1 period of time, and calls the e-mail device again. If the line is busy, the process starts over after waiting a certain period of time. Otherwise, the local server detects ring tone for x2 period of time and disconnects. The local server calls a third time, rings for x3 period of time and hangs up. This completes the notification process.

For the call-back mail delivery method, referring to Fig. 17d, the above described notification process is used, and the local server sets the hardware communication device in auto answer mode. If the client's e-mail device calls back before the end of a specified time period, a handshaking process is executed to verify the security code and the machine code. Then, any outgoing mail messages is retrieved from the e-mail device and any incoming mail is delivered to the e-mail device. When the file exchange process is completed, the line is disconnected, a confirmation signal on the successful delivery of the e-mail messages is sent to the main server via the regional server, and any outgoing mail messages is sent to the main server via the regional server as well. If the e-mail device does not call back after a set period of time and if the try-counter (that keeps count the number of tries) exceeds a maximum try value for the delivery of the messages, it is deemed that mail delivery has failed and an error messages is generated and sent to the regional server to forward to the main server. Otherwise, the try-counter is incremented and the program flow starts from label 2 again to repeat the process.

For the direct mail delivery method, referring to Fig. 17e, a try-counter is initialized and the local

server calls the client's e-mail device. If the e-mail device fails to respond, the try-counter is incremented; and if the try-counter is greater than a maximum try-counter value, an error is deemed to have occurred and an error message is generated and sent to the server. Otherwise, the process is repeated by branching off to label 3. If the e-mail device responds, the process for handshaking, exchanging of any outgoing and any incoming e-mail messages, sending of a confirmation signal, and sending of any outgoing mailbag as above described for the call-back mail delivery process is executed.

In the handshaking process, referring to Fig. 17f, the security code is first verified. If the security code is incorrect, the handshaking process stops and down stream procedures are not executed. This condition is reported to the regional server and the main server for special handling. The machine ID verification process of the e-mail device is similar to the security code verification process.

In the exchange-mail-files process, referring to Fig. 17g, the local server connects to the e-mail device and retrieves any outgoing mail from the e-mail device. Next, the amount of available storage in the e-mail device is determined. If the size of the incoming mail messages is greater than the available storage size, the incoming mail messages are repackaged. The repackaged incoming mail is then sent to the e-mail device, and the process ends. In repackaging the incoming mail messages, referring to Fig. 17h, the incoming mail messages are sorted in order of priority where priority is determined by factors such as the priority code of the message and the date and time stamp of the message. The ordered messages are then selected in order of priority up to the available storage space but leaving space for a system e-mail message to the client that there are additional messages waiting for retrieval or delivery.

A priority code of the present invention can be included as part of the e-mail address itself by

comparing a number in the e-mail address itself to the security code. For example, for jsmith@emailsys.com having a security code of "124", an e-mail address such as "jsmith_123@emailsys.com" would have a higher priority than an e-mail address such as "jsmith_456@emailsys.com" because the number "123" is closer to the security code of "124" than the number "456" is to "124". Thus, by having a single e-mail address, the owner of the e-mail address can give out e-mail addresses with different priority codes.

**Client E-Mail Device - Software**

The client's e-mail device has both a hardware component as well as a software component. The e-mail device can communicate with the local server, regional server, main server, or another e-mail device (for peer-to-peer communication).

Referring to Appendix A, the software pseudo-code for the client's e-mail device is illustrated. When the device is first turned on, a power-on self-test is executed. If there is a fatal failure, the program flow branches to the Fatal_Error_Stop label, sets the fatal error indicator, and halts the system. If a minor failure occurred, the program flow branches to the Warning_Code label, sets a warning code indicator and resumes the program flow. Next, the phone line status is checked. If it is busy, the device will wait until the line is not busy. The e-mail device is then placed in auto-answer mode and the registers for the device are initialized for operation. If there is any failure during this initialization process, a warning code is posted. After the initialization process, the software continuously loops to check for an interrupt from the interrupt registers. If an interrupt is found, the program branches to the Interrupt_Service routine. The Interrupt_Service routine reads the interrupt register, determines the interrupt type, and branches to the corresponding interrupt routine.

An interrupt may be caused by one of the several

subsystems, where the types of interrupts include registration request interrupt, call-back mail delivery interrupt, dial server interrupt (which calls the same procedure as that of the call-back mail delivery interrupt), incoming mail delivery interrupt, and transfer-abort interrupt.

If the call-back interrupt flag is set, the call-server routine is executed where the communication module is set to dial the local server phone number and execute an In_Mail routine.

The In-Mail routine first performs handshaking with the local server communication module. It then sends out any outgoing mail messages prepared by the client, and requests and receives a confirmation signal from the local server. If the confirmation signal from the local server is incorrect, the outgoing mail messages are sent again by branching the program flow to label SendM. Otherwise, the device is instructed to receive incoming mail messages. If the incoming mail messages are not received correctly, a confirmation signal is generated to sent to the local server which would cause the local server to deliver the mail messages again. When the messages are correctly received, the mail indicator is set.

In the handshaking routine, the device receives the security code from the local server, verifies the code, and branches to the Bye routine if it is incorrect. Similarly, the device receives the machine ID, verifies the ID, and goes to the Bye routine if it is incorrect. The device then sends the security code and the available storage size to the local server.

Back to the Interrupt_Service routine, if the Incoming_Mail interrupt flag is set, the program flow branches to the In_Mail routine as described above.

If the Registration_Request interrupt flag is set, this flag indicates that the client has placed the device in registration mode in order to register with the main server. This process is generally executed when the device is being set up for the first time or

when the device has been moved to a new location. The program flow branches to the Registration_Request routine, where the device dials a designated phone number for registration. Generally, this is a 800 toll free number connected to the main server. When connected, the device delivers the machine ID, the security code, and the client's phone number to the main server. The main server determines the particular local server for serving the client's e-mail device based upon the given phone number. The phone number for the particular local server is sent to the client device, and the client device retains the number in memory for later use.

The dial_server interrupt flag is set by the client to send and retrieve mail messages. Like the call_back interrupt, it calls the call_server routine.

In the case where the local server is using the direct mail delivery method, the Incoming-mail flag is set and the In_Mail routine is executed as described above.

In the case where a request has been made to disconnect the line, the Transfer-Abort flag is set which causes any phone connection to be disconnected.

In the case where the hardware for the e-mail device is part of another computer system (e.g. personal computer system) in the form of an expansion card or a part of an expansion card, the interface with the e-mail device can be integrated with a mail program of the computer.

**Client E-Mail Device - Hardware**

The hardware component of the e-mail device may be embodied in several different manners. In one form, the e-mail device is a low-cost stand alone device directly connected to the phone line before the phone line is connected to other devices (e.g. answering machine, fax machine, etc.). The stand-alone embodiment interacts with the e-mail system as described above. More particularly, the software for the e-mail device as

described above is configured and stored in the ROM of the e-mail device.

In another hardware embodiment, the e-mail device is an integral part of a computer expansion card having power supplied from two sources, the computer system itself or an external power supply. Referring to Fig. 18a, an expansion card 1050 having an edge connector 1052 is illustrated. The expansion card is insertable into an edge connector slot connected to the bus of a computer system. The expansion card includes a CPU 1054 (or microcontroller) directly polling an I/O register 1056 that is communicatively connected to a notification module 1058. The I/O register 1056 receives information from the notification module 1058 and the user input and control device 1057 (which can be a keyboard, a keypad, dip switches, etc.) for entering security code, e-mail messages, or other inputs, and generates signals for indicators 1059 to indicate the status of any messages and the e-mail device. The notification module sends and receives information via a phone line connection and interacts with the communication module 1062. When the expansion card is inserted into the computer system, a bus controller 1064 controls the data flow to and from the computer system (not shown) via the edge connectors 1052. Information is passed between the flash memory 1066, the ROM 1068, the RAM 1070, the CPU 1054, and the communication module 1062 through an internal bus 1072. The communication module can be a fax/modem chipset. The expansion card 50 may be powered by one of two sources, power from the computer system via trace 1074 or power from an external source via trace 1076 and power jack 1078. The power switching and conversion module 1080 detects power from one of the two sources, performs any power conversion from one voltage level to another voltage level if it is needed, and routes the power to the components on the expansion card 1050. The power detection and switching is automatically performed without interruption to the operation of the e-mail device. Thus, no interruption of operation would occur

if power is switched in the midst of sending or receiving e-mail messages.

In this embodiment, when the computer system is on, the expansion card may be controlled and operated by the software of the computer system. When the computer system is off, unattended, or not controlled by the software of the computer system, the expansion card obtains its power supply from an external source and operates in accordance with the software described above.

Mailing program on the computer system having the e-mail expansion card would have software routes for sending and retrieving e-mail messages between the computer system and the e-mail expansion card. Referring to Fig. 18b, the pseudo-code for the computer system to retrieve e-mail messages from the expansion card is illustrated. The status of the card is first verified. If the card is not busy, the in-mail message flag (indicating the existence of new e-mail messages) is checked. If there is a new message, the message is transferred to the computer system and the storage area is cleared. Then, the message is displayed on the computer screen of the computer system. Referring to Fig. 18c, the pseudo-code for the computer system to transfer prepared e-mail messages to the expansion card for outbound is illustrated. If the card status is not busy and if there is enough storage space to store all of the e-mail messages, the e-mail messages are transferred to the expansion card and the computer can be turned off. If the storage on the card is insufficient, the user is informed to wait until the messages are sent before turning the computer off.

In yet another hardware embodiment, referring to Fig. 19a, the communication module of Fig. 18a is a commonly available external fax/modem. For an external modem, its serial port 1086 may be connected to the serial port of the computer system. The expansion card 1082 (now without the communication module) communicates with the modem 1084 through serial port 1086. The

notification device may be connected to the modem via standard phone jacks and a phone line 1088. In this embodiment, the cost of the expansion board now without the communication module is reduced. A phone line signal would come in on jack 1090 and be processed in the same manner as described above.

Fig. 19b illustrates the embodiment for an internal modem where the e-mail expansion card 1082 is mounted on the mother board 1083 and has a phone jack 1092 for receiving the phone line and phone signal and a phone jack 1093 for passing the phone signal to the modem card 1094 via phone line 1097. The modem card 1094 is mounted on the mother board 1083 as well and receives the phone signal at phone jack 1095 and passes the phone signal out at phone jack 1096. The e-mail expansion card directly communicates with the modem card via ribbon 1098. Ribbon 1098 on one end is communicatively attached to the expansion card 1082 and on the other end it can be a ribbon cable inserted into a bus connector slot 1105 of the mother board along with the modem card. Fig. 19c shows that the ribbon cable 1098 at the end having three contact surfaces 1099, 1101, and 1103. Contact surface 1103 makes electrical contacts with selected tabs on one side 1107 of the edge connector of the modem card 1094 and selected tabs on one side of the bus slot 1105. Contact surface 1101 makes physical contact (but no electrical contact) with the bottom of the bus connector slot 1105. Contact surface 1099 makes electrical contact with selected tabs on the other side of the edge connector of the modem card 1094 and selected tabs on one side of the bus slot 1105. In this manner, the modem card can communicate with the computer system and the e-mail expansion card, and the e-mail expansion card is allowed a greater amount of direct control over the modem card. In the case where power is being supplied by an external source, the power can be supplied to the modem card through certain of the selected tabs.

Note that in both Figs. 19a and 19b, the e-mail

expansion card optionally can have complete control over the external or internal fax/modem where all communication between the CPU and the fax/modem has to pass through the e-mail expansion card. In another word, the e-mail expansion card can encapsulate the fax/modem. In Fig. 19b, encapsulating can be achieved by providing a ribbon cable having printed traces on one side and non-conductive material on the other side. The modem card nevertheless is inserted into the bus slot but it does not communicate through the traces in the bus slot. Conventional methods can be applied as well where the e-mail expansion card and the internal modem card are connected via simple ribbon and connectors on each card.

In yet another embodiment of the invention, referring to Fig. 19d, the e-mail device 1130 is a stand-alone card having an slot connector 1144 able to receive a regular fax/modem card 1132. The e-mail device has a connector 1138 for receiving ac or dc power supply, a communication port 1136 (such as a serial port), and a phone jack for receiving a phone line 1134 and also a jack for passing a phone signal to another device 1135. Likewise, the fax/modem card 1132 has a jack for receiving a phone signal 1142 and a jack for passing through a phone signal 1143. This embodiment can be placed in a physical box.

Further note that although the e-mail device is illustrated as an expansion card it can be easily converted into an external device like that of the common external fax/modem device. Moreover, the expansion card can be converted to a stand alone device with a display. Moreover, communication devices are not limited to the fax/modem devices illustrated above. ISDN devices, cable modem, wireless modem, or other communication devices can be used as communication devices as well.

The hardware embodiment for implementing the ringing protocol described above requires a tone detection circuit. Referring to Fig. 20, on the local

server side, the local server provides the dialing and answering functionalities 1052 through the use of a modem 1057 or other communication devices or modules. The modem controls the phone line 1055 to dial the telephone number of the client's e-mail device, and the tone detection circuit 1053 detects the ringing tone and reports it to the local server 1056. The local server determines the length of ringing time and instructs the modem to disconnect when the predetermined period of time has been reached.

On the client e-mail device end, the notification device 1054 detects the ringing signal, the time lapsed for each ringing signal and the time lapsed between the signals. It then determines whether a valid notification code has been received. Referring to Fig. 21, on the client side, the microcontroller 1058 operates a ringing signal detection circuit 1049 and a modem 1047 in detecting whether a valid ringing code has been received.

**Integration of the E-Mail Device**

The above described e-mail device may be integrated into other devices. For example, the e-mail device may be part of a phone, a fax machine, an answering machine, etc. If the e-mail device is integrated with a fax machine, e-mail messages can be readily printed out and any outgoing mail messages may be composed through the use of the numeric keypad. Fig. 22 illustrates one embodiment of the e-mail device integrated with a fax machine. In this embodiment, there is a transmitter subsystem 1100, a receiver subsystem 1102, and a modem 1104 that can be connected to a telephone line 1106. The modem incorporates a control module 1125 to execute the ringing protocol described above and distinguishes a fax/modem signal from an e-mail message signal (or protocol) to activate the corresponding portion of the circuitries.

The transmitter 1100 can process two signals, one signal for faxing and one signal for mailing messages.

For faxing a document, the document is first scanned by a scanner 1108 and the scanned signal is converted to a digital format 1110. For mailing messages, the prepared mail messages are stored in memory 1114 and converted to raster graphic image 1126. Note that a number of methods are available for composing mail messages, including the use of a keyboard, a keypad, etc. The composed messages are then stored in memory. A multiplexer 1116 selects one of the two signals to pass through to the compressor 1112 and then to the modem 1104 for transmission in accordance with the selected mode.

The receiver subsystem 1102 processes incoming fax signal or mail message signal. For a fax signal, the signal is decompressed 1118 and sent to the printing subsystem 1122 through a multiplexer 1120. For an e-mail message signal, the signal is received and processed by an integrated e-mail device (and software) 1124 as described above. The output from the e-mail device is converted to image format 1126 and sent to the printing subsystem 1122 via the multiplexer 1120. Again, the multiplexer selects the signal to be sent to the printing subsystem in accordance with the selected mode.

**REMOTE CONTROL OF THE SERVERS**

The servers can be remotely operated and control by using commercially available communication software or tailored software. The ringing protocol may be used to set and reset the servers. Appendix B illustrates one set of pseudo-code for remote controlling the servers. Referring to Fig. 23, the server computer 1210 is connected to the network 1200 via a direct connection 1214 and through a modem 1212. The modem provides a remote login path to the server in order to control or maintain the server. If the server does not respond to the remote login, the ringing protocol of the present invention embodied in the notification device 1205 can be used to detect ringing pattern. Upon receiving a

proper ringing pattern, the notification device sends a signal to the server computer via line 1207 to prepare for shut-down and a signal to the power control module 1206 to generate a pulse to toggle the relay 1202 for a proper period of time to reboot the computer.

The software described herein for implementation of the e-mail system can be written specifically for this particular application in the programming language of choice. It can also be implemented through the use of existing system mail utility programs. For example, under the Unix system, an entire set of mail utility programs are available for the sending and receiving of mail messages.

Although the present invention has been described in terms of the presently preferred and second embodiments, it is to be understood that such disclosure including combinations of the two embodiments is not to be interpreted as limiting. Various alterations and modifications including the various combinations of the two embodiments will no doubt become apparent to those skilled in the art after reading the above disclosure. Accordingly, it is intended that the appended claims be interpreted as covering all alterations and modifications as fall within the true spirit and scope of the invention.

APPENDIX A

```
Client software codes on communication card or on a
stand alone system
Kernel
     POST (Power on self-test)
     If fatal failure, go to Fatal_Error_Stop
     If minor failure, go to Warning_code
     Check line status; if busy, wait until line is not
busy;
     Set up communication module in auto-answer mode
     Set up other I/O registers, devices
     If any failure, go to Warning_code
loop Polling interrupt
     If interrupt found, jump to Interrupt_service
     go to loop

Fatal_Error_Stop:
     set error indicator or display
     Holt

Warning_code: (input: warning code)
     set warning indicator (or display)
     return

Interrupt_Service:
     Read interrupt register
     Check the interrupt type

     case of:
          Call_back:  jump to Call_server
          Registration request:  jump to Reg_req
          Incoming_mail:  jump to In_mail
          Dial_server:  jump to Call_server
          Transfer_abort:  jump to Tfr_abort
     end case:

     Clear the interrupt that has been serviced
     return

Call_server:
     set up communication module to dial
     read_server_number
     dial (phone)
     In_mail;
     return

Bye:
     hangup
     set up communication module in auto answer mode
     return

In_mail:
          Handshaking
sendM     send outgoing mail
          receive transfer confirm info.
          If confirmation info not correct, go to sendM
to retry
          send available storage size
revM      receive incoming mail
          send receive confirmation info
```

```
            If confirmation info is not correct go to revM
            set Mail_in indicator
            return

      Handshaking:
            check the security code, if not correct, go to Bye
            receive machine ID from server (if it is used)
            check the machine ID, if not correct, go to Bye
            return

      Reg_req:
            dial the (800) number
            establish connection
            display greeting
            send machine ID
            send security codes
            echo the security code
            print "enter your phone number"
            read phone_number
            send phone number
            receive and save local server number(s)
            print "registration done"
            return

      Tfr_abort:
            save all data for immediate disconnection
            hangup
            return
```

APPENDIX B

```
Remote monitor and control of the local server

{ Codes for every local server }

Program diag_report;
begin
     Do the following every hour
          begin
          run_diagnostics_and log results
          check any problem
          mail the report to the main server
          end
end

{ Codes on main server }


Program remote_monitor;
begin
Do the following for every hour
     begin
     get_new_mail:  //the mail are diag report from
local server
     if there is mail
          begin
          check the report from each local server
          if there is a problem
               begin
               remote_dia_contrl:  //reference point
               rlogin local server //remote login & run
diag.
               if rlogin fail goto cold_boot
               run more extensive diagnostics
               if the problem is correctable correct the
program
               else reboot   //(software warmboot)
                    begin
                    wait for reboot;
                    rlgoin local server
                    if rlogin fail goto cold_boot
                    if system is okay, exit
                    else
                         begin
cold_boot:               remote_shutdown_process (n,m);
                         //hardware cold boot
                         // n,m are the secret code like
                         notification device
                         wait for reboot
                         rlgin local server
                         if system is okay, exit
                         else report problem to operator
                         end
                    end

          else
          if it is too long for not receiving mail
               begin
               rlogin the local server
```

```
                go to remote_dia_contrl
                end
        end
end

{    The remote shutdown process uses a method similar
to the notification device, but it requires much higher
security in order to prevent unauthorized shutdown.  So,
the following procedure uses two codes instead of one
code.  Again the code represents the ring tone length
difference for two consecutive dialings.  The first code
n is for the difference between the ringing period of
the first call x1 and the second call x2, and m is for
the difference between x2 and the ringing period of the
third call x3.  Typically, n and m are small numbers
which can be positive or negative numbers.  More codes
can be used to achieve even greater security.}

process remote_shutdown_process (n,m);
begin
     start_point;    //just a reference point
     call (phone_number)
          if line busy, wait and go to start_point
     detect_ring_tone for x1 second
     disconnect;
     wait w1 seconds;
     call (phone_number);
          if line busy, wait and go to start_point
     detect_ring_tone for x2 second      //x2=x1+n
     disconnect
     wait w1 seconds;
     call (phone_number);
          if line busy, wait and go to start_point
     detect_ring_tone for x3 seconds     //x3=x2+m
     disconnect;

end
```

## CLAIMS

I claim:

1. A telephonic electronic message apparatus for automatically receiving electronic messages comprising:
a means for adapting to an existing telephone line for receiving said electronic messages; and
a processing means for automatically responding to said electronic messages and for storing said messages therein whereby said electronic messages may be received and stored without requiring a human operation.

2. The telephonic apparatus of claim 1 further comprising:
an user interface means for providing information to an user relating to a reception of said electronic messages.

3. The telephonic apparatus of claim 2 further comprising:
a telephone adapting means for connecting to a telephone;
said processing means further including a telephone interface means for detecting an incoming signal received from said telephone line and for determining if said incoming signal being an electronic message and for transmitting said incoming signal to said telephone when said incoming signal being detected is determined not an electronic message.

4. The telephonic apparatus of claim 2 wherein:
said user interface means further including a display means for displaying a message relating to the reception of said electronic messages.

5. The telephonic apparatus of claim 2 wherein:
said processing means further including a message storage means for storing said electronic messages therein.

6. The telephonic apparatus of claim 3 further comprising:

an electronic message exporting means for delivering said electronic messages via a transmitting means to a receiving device.

7. The telephonic apparatus of claim 6 wherein:

said electronic message exporting means including a television interface means for delivering said electronic messages via said transmitting means to a television for displaying said electronic messages thereon.

8. The telephonic apparatus of claim 7 wherein:

said user interface means further including an message exporting control means for controlling a display of said electronic message on said television.

9. The telephonic apparatus of claim 3 further comprising:

an automatic registration means for storing required registration data therein and for automatically dialing and registrating with a network server for receiving said electronic messages therefrom.

10. The telephonic apparatus of claim 3 further comprising:

a removable data storage means for storing said electronic messages therein for removably transferring said electronic messages therefrom.

11. The telephonic apparatus of claim 5 further comprising:

a message full means for terminating a reception of said electronic messages when said message storage means reaching a full storage capacity.

12. The telephonic apparatus of claim 3 further comprising:

a message screen means for detecting designated message identifications in said electronic messages for receiving and storing said electronic messages with said designated message identifications.

13. The telephonic apparatus of claim 3 further comprising:

an automatic logon means for automatically dialing and logging on a network server periodically for receiving said electronic messages therefrom.

14. The telephone apparatus of claim 4 wherein:

said user interface means further including a display control means including control buttons for controlling the display of different electronic messages.

15. A telephonic electronic message apparatus for automatically receiving electronic messages comprising:

a means for adapting to an existing telephone line for receiving electronic messages including digitized signals therefrom;

a processing means for automatically responding to said electronic messages wherein said processing means further including a message storage means for storing said electronic messages therein;

an user interface means including a display means for displaying information to an user relating to a reception of said electronic messages, said user interface control means further including a display control means including control buttons for controlling the display of different electronic messages;

a telephone adapting means for connecting to a telephone;

said processing means further including a telephone interface means for detecting an incoming signal received from said telephone line and for determining if said incoming signal being an electronic message and for transmitting said incoming signal to said telephone when

said incoming signal being detected is determined not an electronic message;

an electronic message exporting means for delivering said electronic messages via a transmitting means to a receiving device wherein said electronic message exporting means including a television interface means for delivering said electronic messages via said transmitting means to a television for displaying said electronic messages thereon;

said user interface means further including an message exporting control means for controlling a display of said electronic message on said television;

an automatic registration means for storing required registration data therein and for automatically dialing and registrating with a network server for receiving said electronic messages therefrom; and

a message full means for terminating a reception of said electronic messages when said message storage means reaching a full storage capacity.

16. The telephonic apparatus of claim 15 further comprising:

a message screen means for detecting designated message identifications in said electronic messages for receiving and storing said electronic messages with said designated message identifications.

17. The telephonic apparatus of claim 16 further comprising:

a removable data storage means for storing said electronic messages therein for removably transferring said electronic messages therefrom.

18. The telephonic apparatus of claim 15 further comprising:

an automatic logon means for automatically dialing and logging on a network server periodically for receiving said electronic messages therefrom.

19. The telephonic apparatus of claim 15 wherein:

said telephonic apparatus being provided for receiving a plurality of message units; and

said user interface means including a message unit access Control means for controlling an access to each of said plurality of message units.

20. A method for providing communication between a local electronic message server and a telephone user connected with telephone line to the server comprising the steps of:

(a) providing a telephonic electronic message apparatus (which including a means for adapting] adaptable to said telephone line for receiving electronic messages from said local server; and

(b) providing a processing means for said telephonic electronic message apparatus for automatically receiving electronic messages for storing said messages therein whereby said electronic messages may be received and stored without requiring a human operation.

21. An electronic message communication system comprising:

a local electronic message server connected to an internet system for receiving said electronic messages therefrom and sending said electronic messages thereto;

a telephonic electronic message apparatus connected to said local electronic message server by a telephone line wherein said telephonic electronic message apparatus includes a means for adapting to said telephone line; and

said telephonic electronic message apparatus further includes a processing means for automatically receiving said electronic messages transmitting from said local server through said telephone line for storing said messages in said telephonic electronic message apparatus whereby said electronic messages may be received and stored without requiring a human

operation.

22. The electronic message communication system of claim 21 wherein:

said telephonic electronic message apparatus includes a registration trigger means and an automatic registration dial-up means for automatically sending a plurality of identification messages to said local server for registration upon an actuation of said registration trigger means; and

said local electronic message server includes a registration processing means for receiving said plurality of identification messages for processing a registration Of said telephonic electronic message apparatus in said local server.

23. The electronic message communication system of claim 21 wherein:

said telephonic electronic message apparatus includes an auto collect triggering means and an collect dial-up means for automatically sending a plurality of auto collect messages to said local server upon an actuation of said auto collect trigger means; and

said local electronic message server includes an auto collect processing means for receiving and responding to said plurality of auto collect messages for automatically sending a plurality of electronic messages to said telephonic electronic message apparatus.

24. The electronic message communication system of claim 21 wherein:

said local electronic message server includes an message priority processing means for checking a priority of each of said electronic messages and for sending each of said electronic messages to said telephonic electronic message apparatus according to said priority.

25. The electronic message communication system of claim 21 wherein:

said local electronic message server includes a storage capacity processing means for checking a storage capacity of said telephonic electronic message apparatus and for sending said electronic messages thereto according to said storage capacity whereby a message overflow of said telephonic electronic messages apparatus may be prevented.

26. The electronic message communication system of claim 22 wherein:

said automatic registration dial-up means provided for automatically sending a plurality of said identification messages including a telephone number, a machine number and a user password.

27. A method for sending and receiving electronic mail messages over an interconnected network of computers where one of said interconnected computers is configured to receive mail messages having a particular domain address, said configured computer electronically connected to one or more mail servers each designated for a particular geographical region and each electronically connected to one or more electronic mail messaging devices each having a particular address within said domain address for receiving electronic mail messages addressed to said particular address, wherein each of said devices contains dedicated electronic circuitries for sending, receiving, and storing electronic mail messages, said method comprising the steps of:

receiving one or more electronic mail messages each addressed to a particular address within said domain address;

determining the mail server for delivering each of the electronic mail messages in accordance to their respective particular addresses;

packaging the electronic mail messages for a mail

server into a mailbag for delivery;

sending said mailbag to said mail server;

unpackaging said mailbag and recontructing the electronic mail messages from said mailbag at said mail server; and

delivering each of the electronic mail messages to the corresponding electronic mail messaging devices.

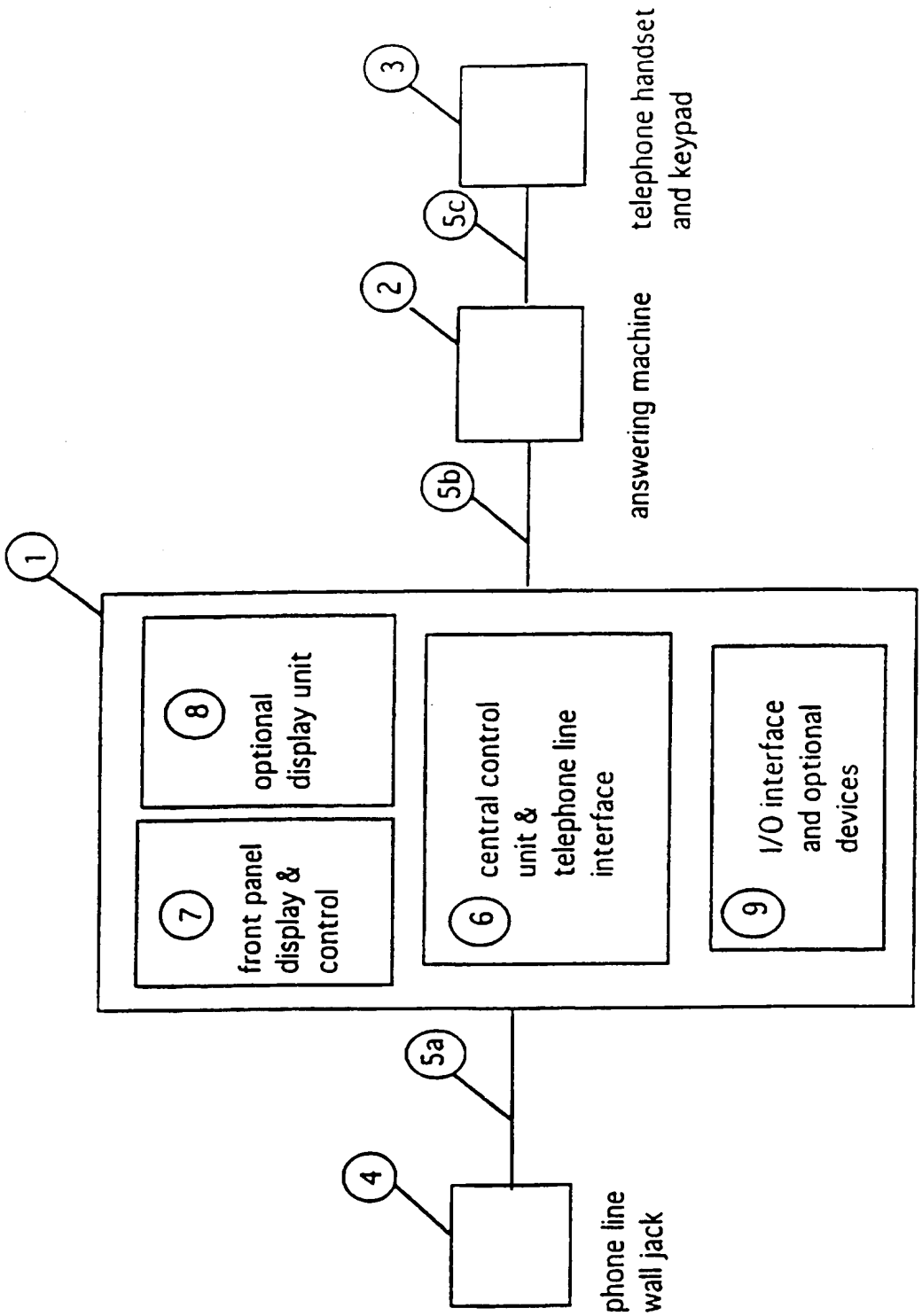


Fig. 1 connection of E-mail apparatus and telephone & answering machine

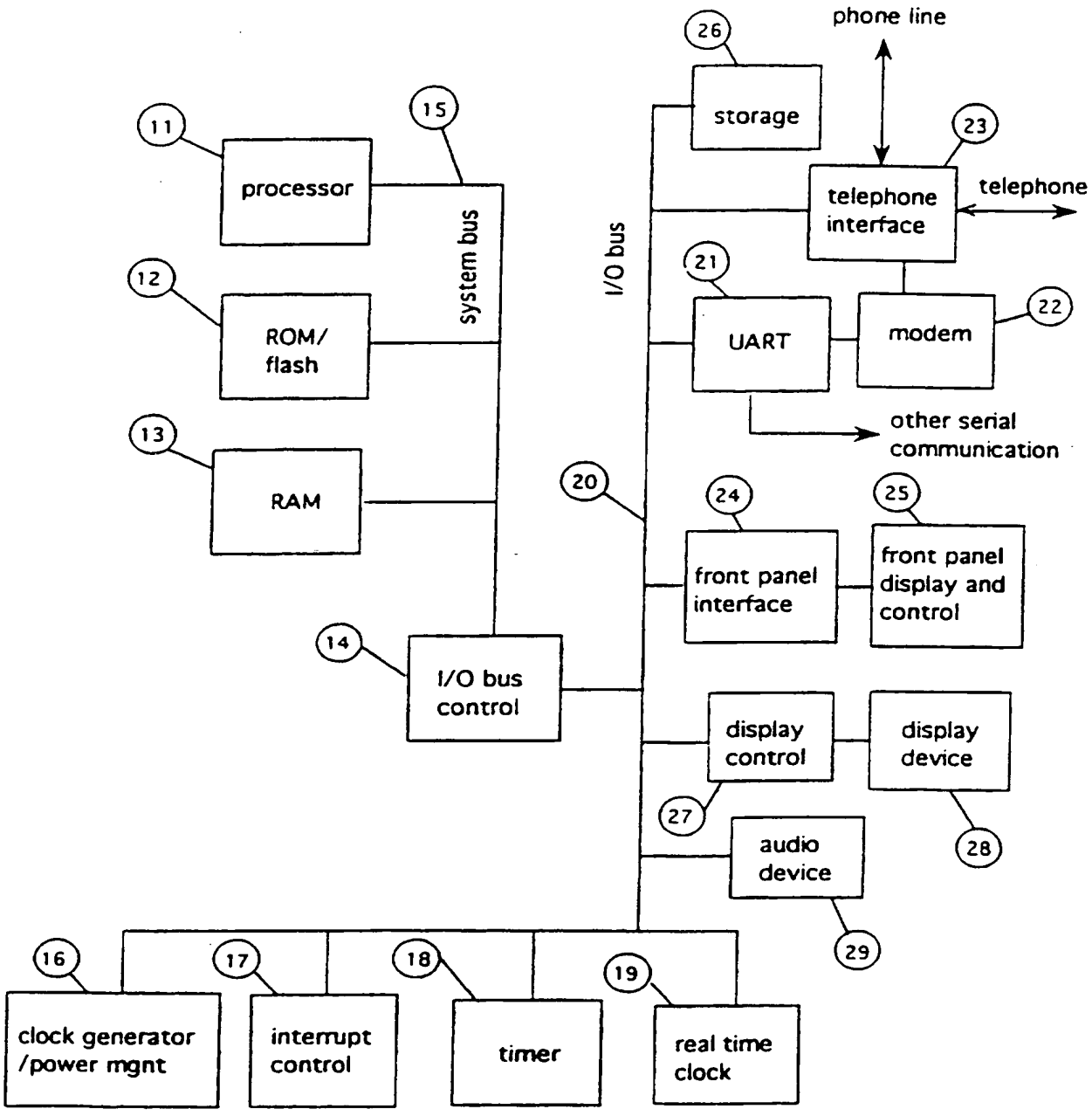


Fig 2.Block diagram of the E-mail apparatus

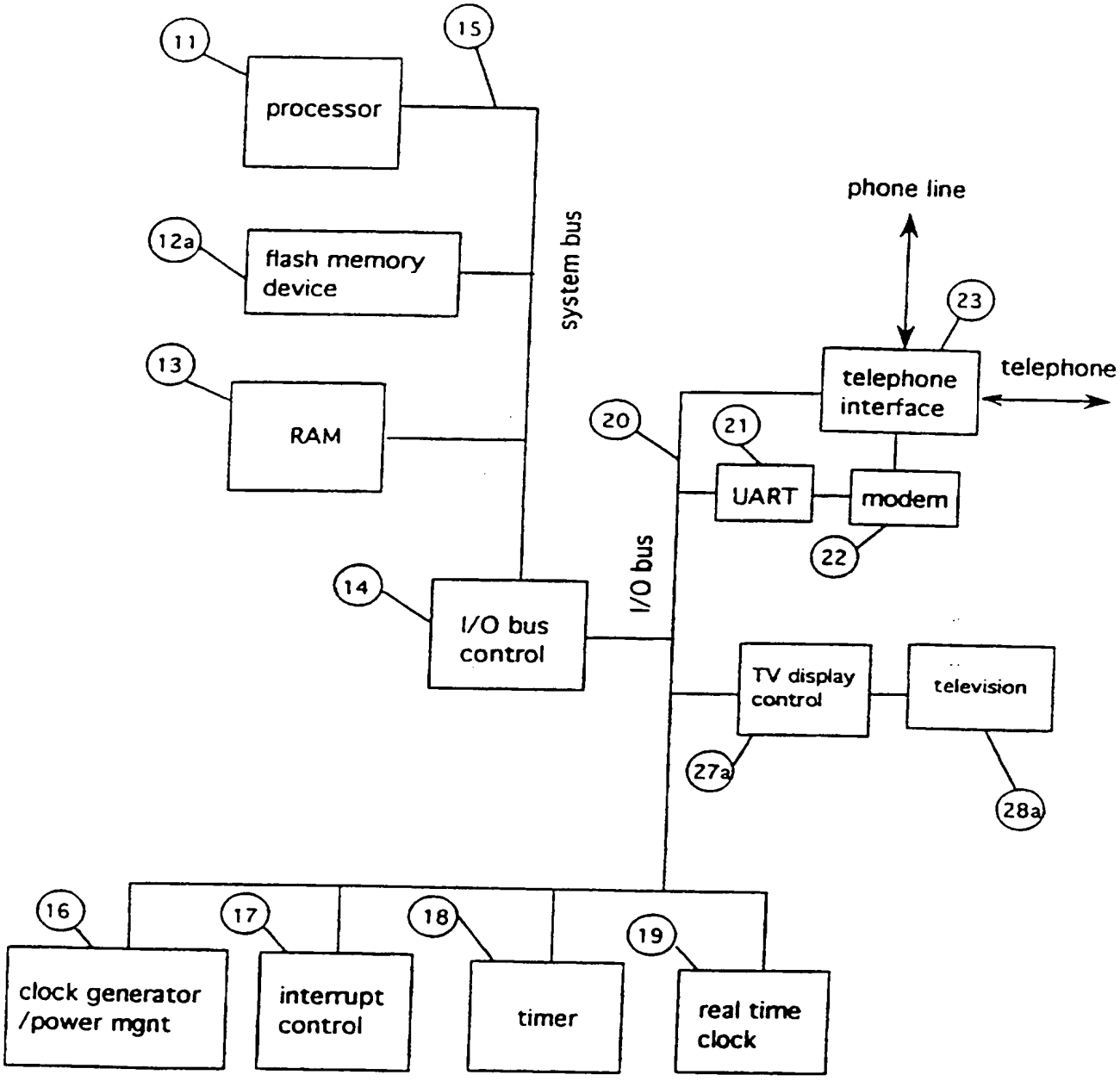


Fig 2a. Example of the E-mail apparatus implementaiton

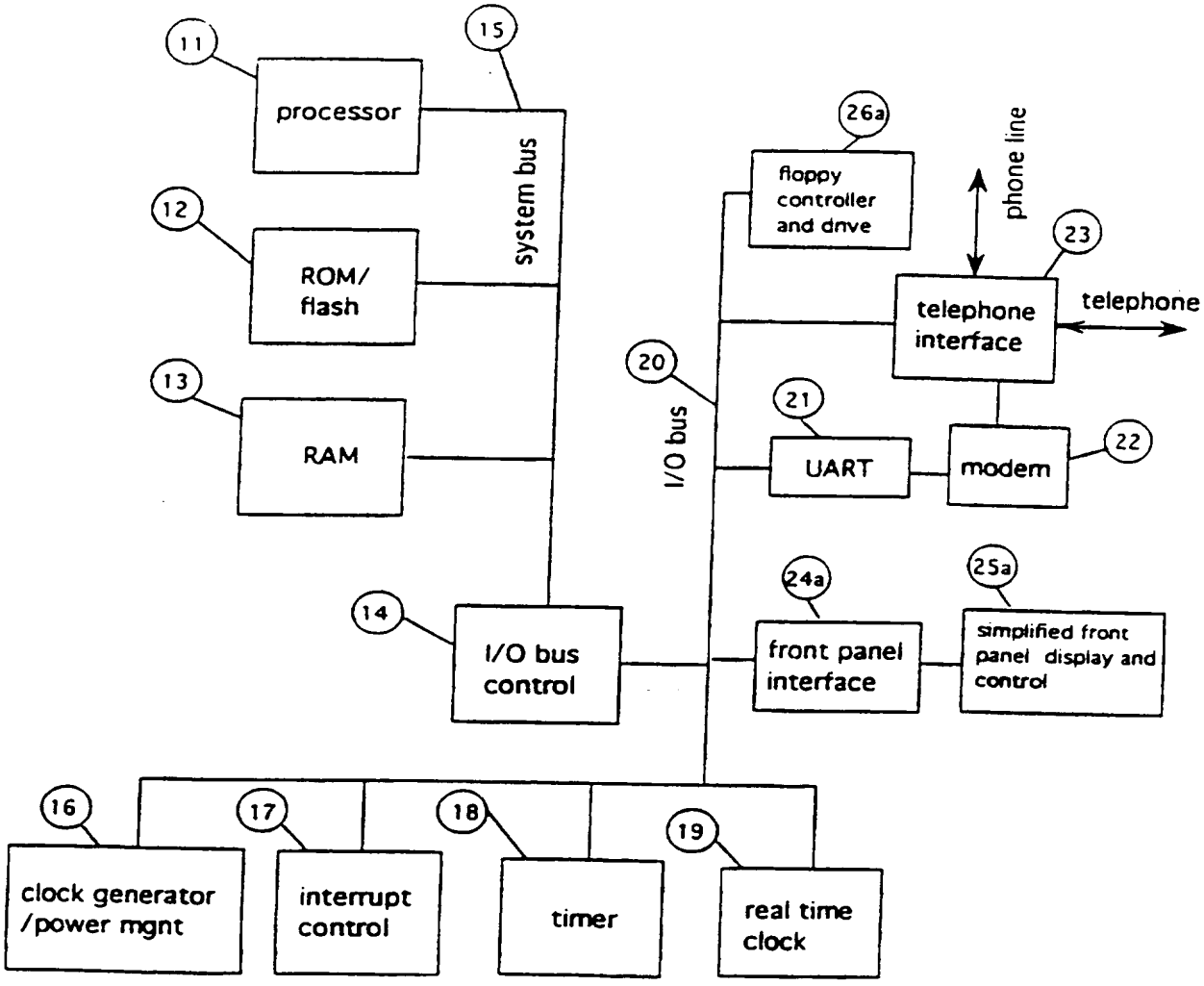


Fig 2b. Example of the E-mail apparatus implemention

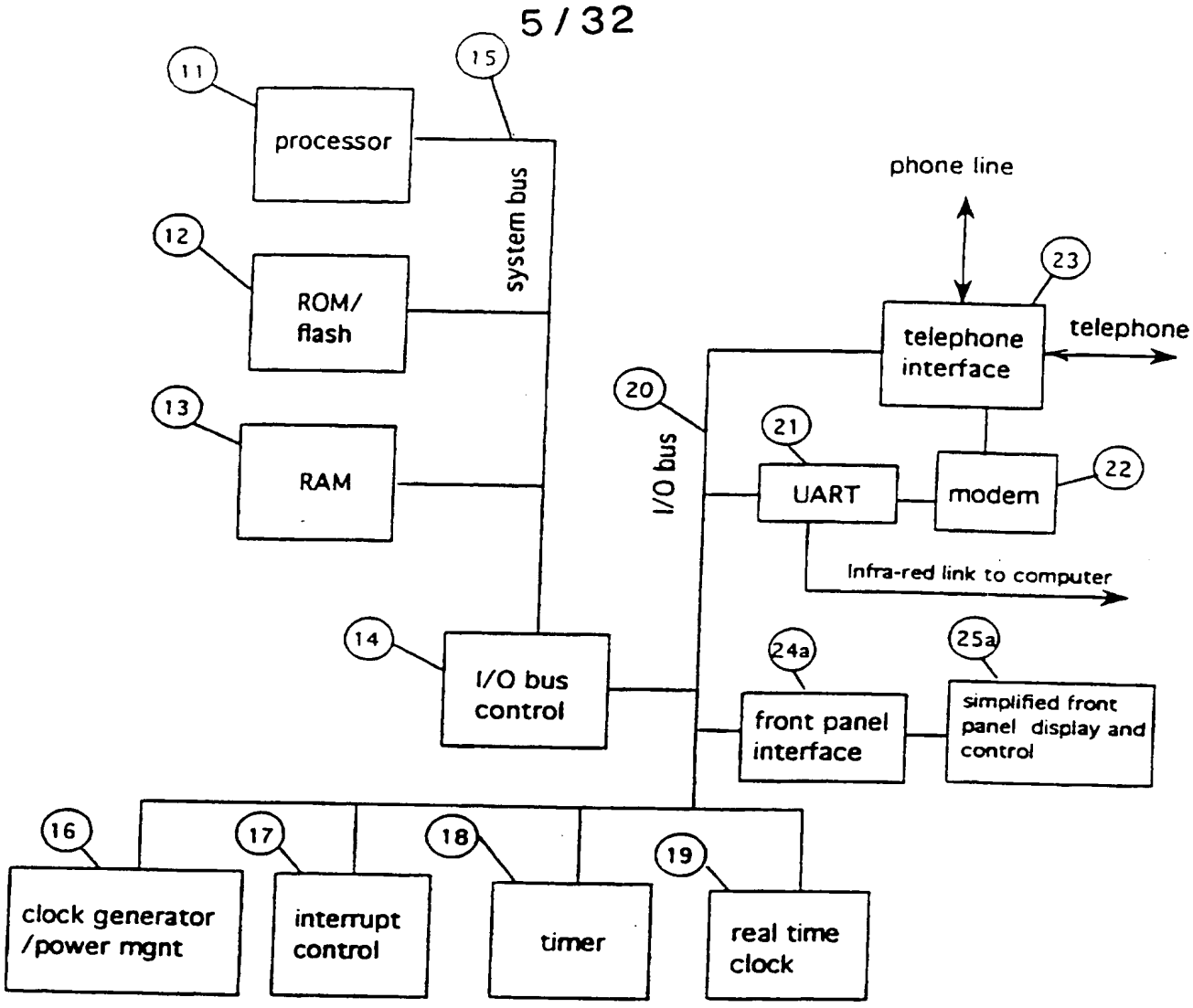


Fig 2c. Example of the E-mail apparatus implementation

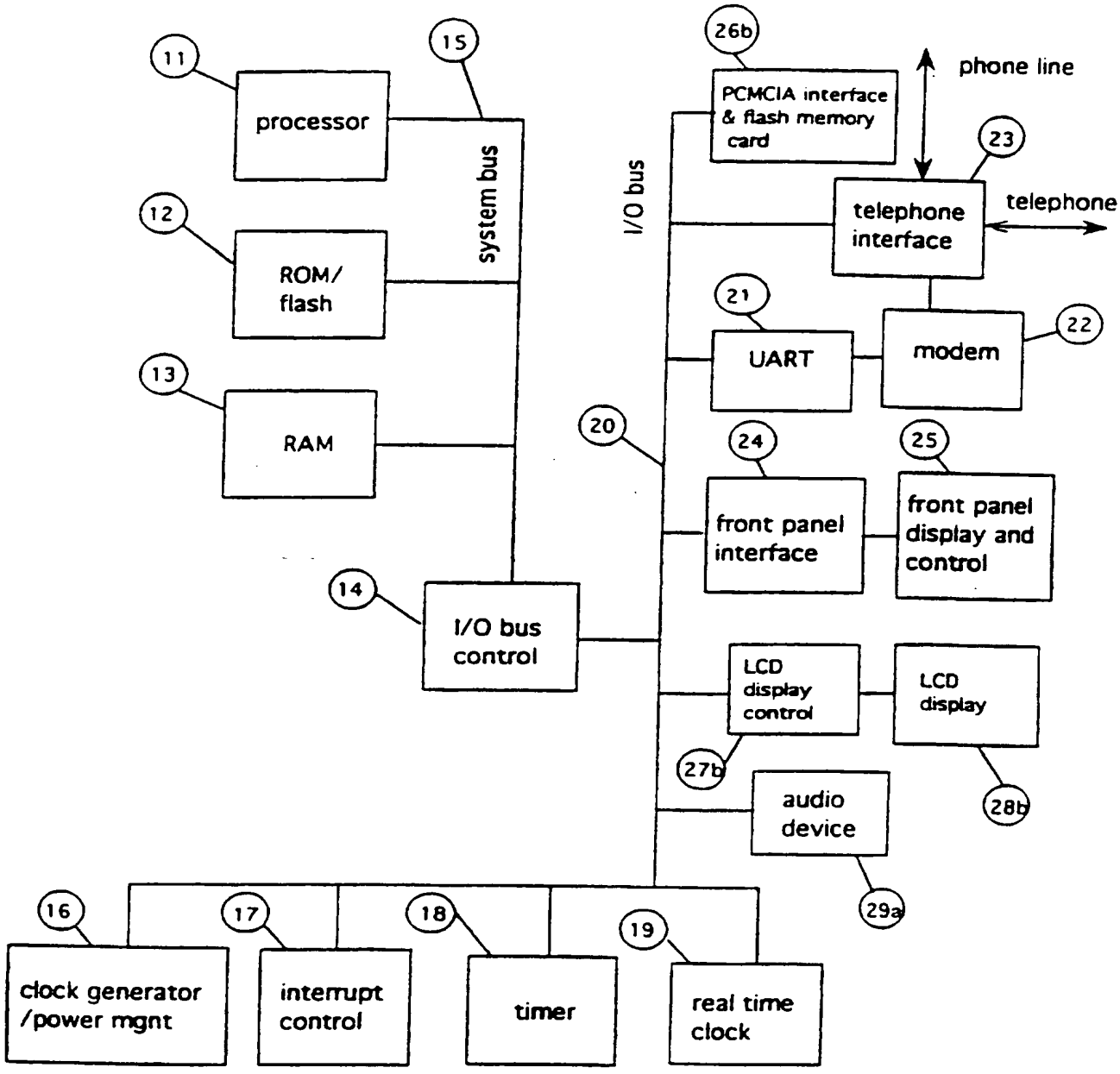


Fig 2d. Example of the E-mail apparatus implementation

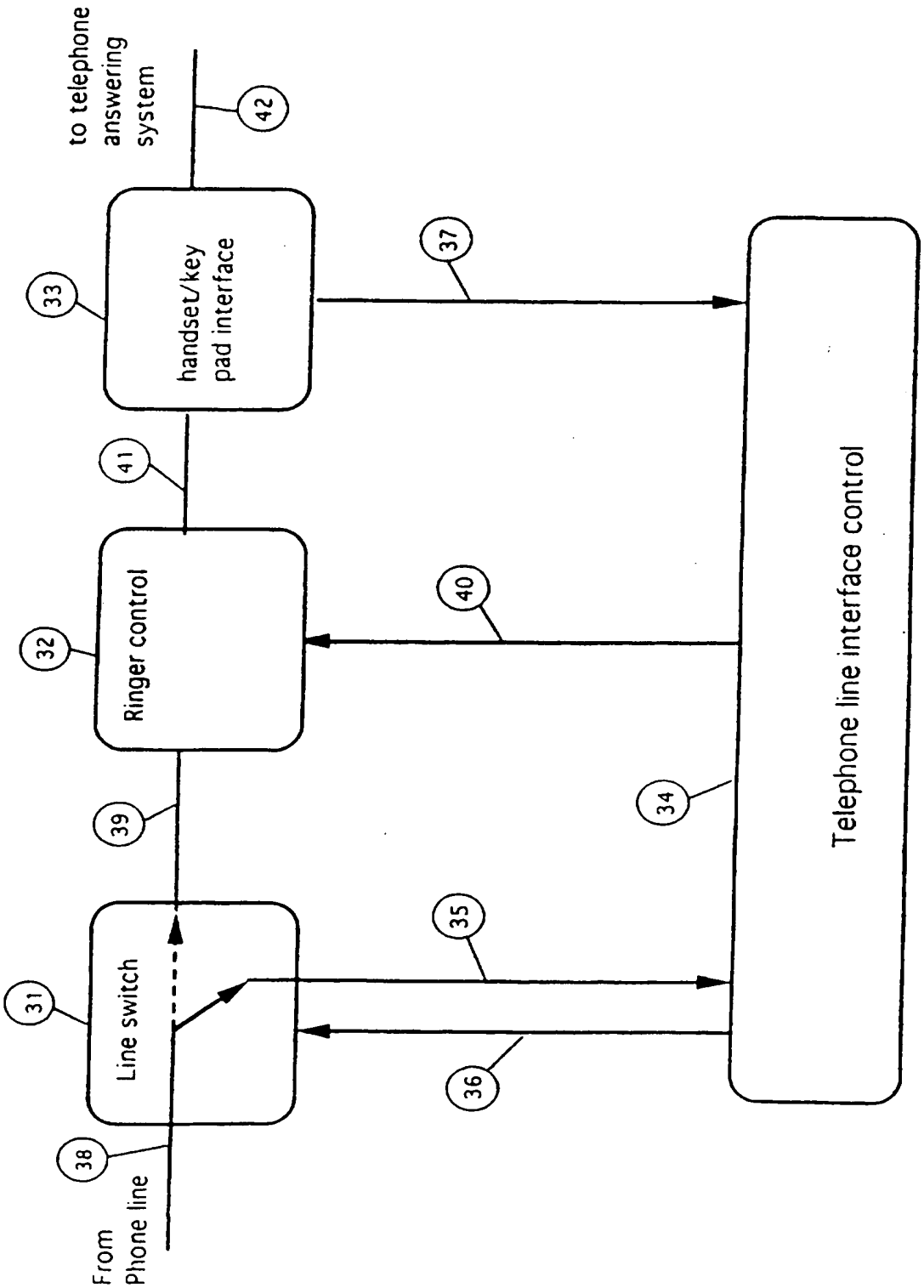


Fig. 3 Telephone interface block diagram

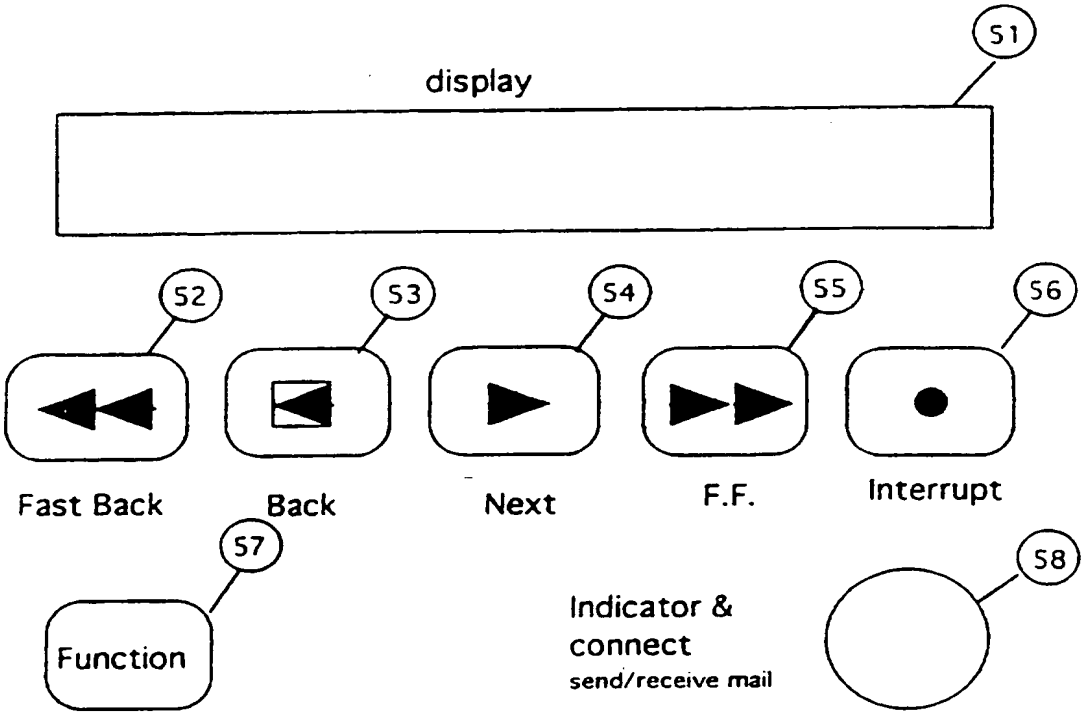


**Figure 4: Front panel interface**

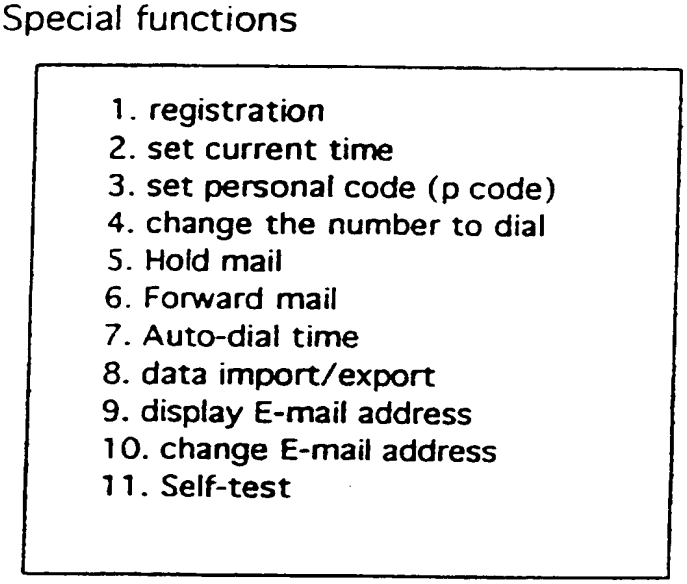


Figure 5: Example of special functions menu

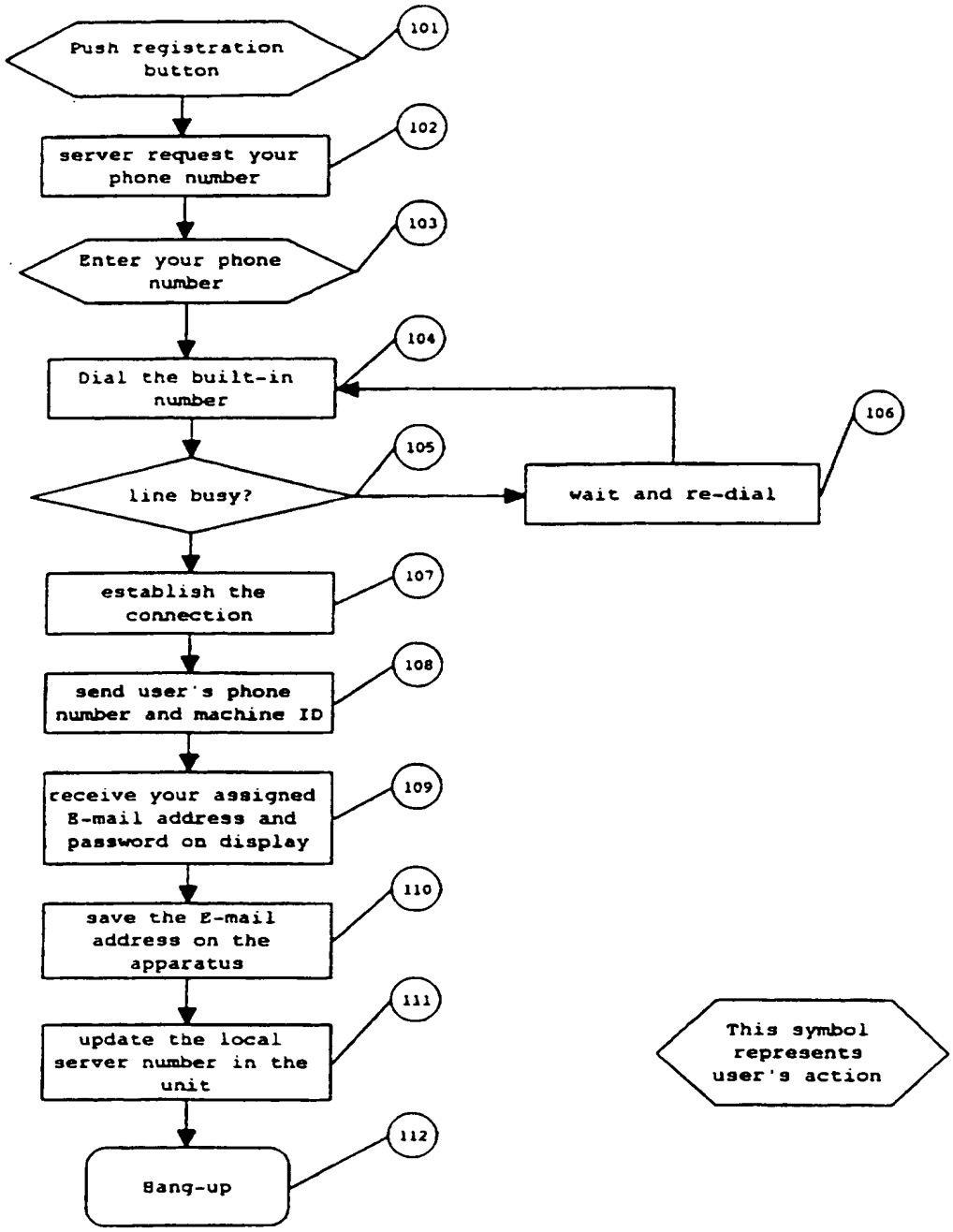


Figure 6: Easy registration flow

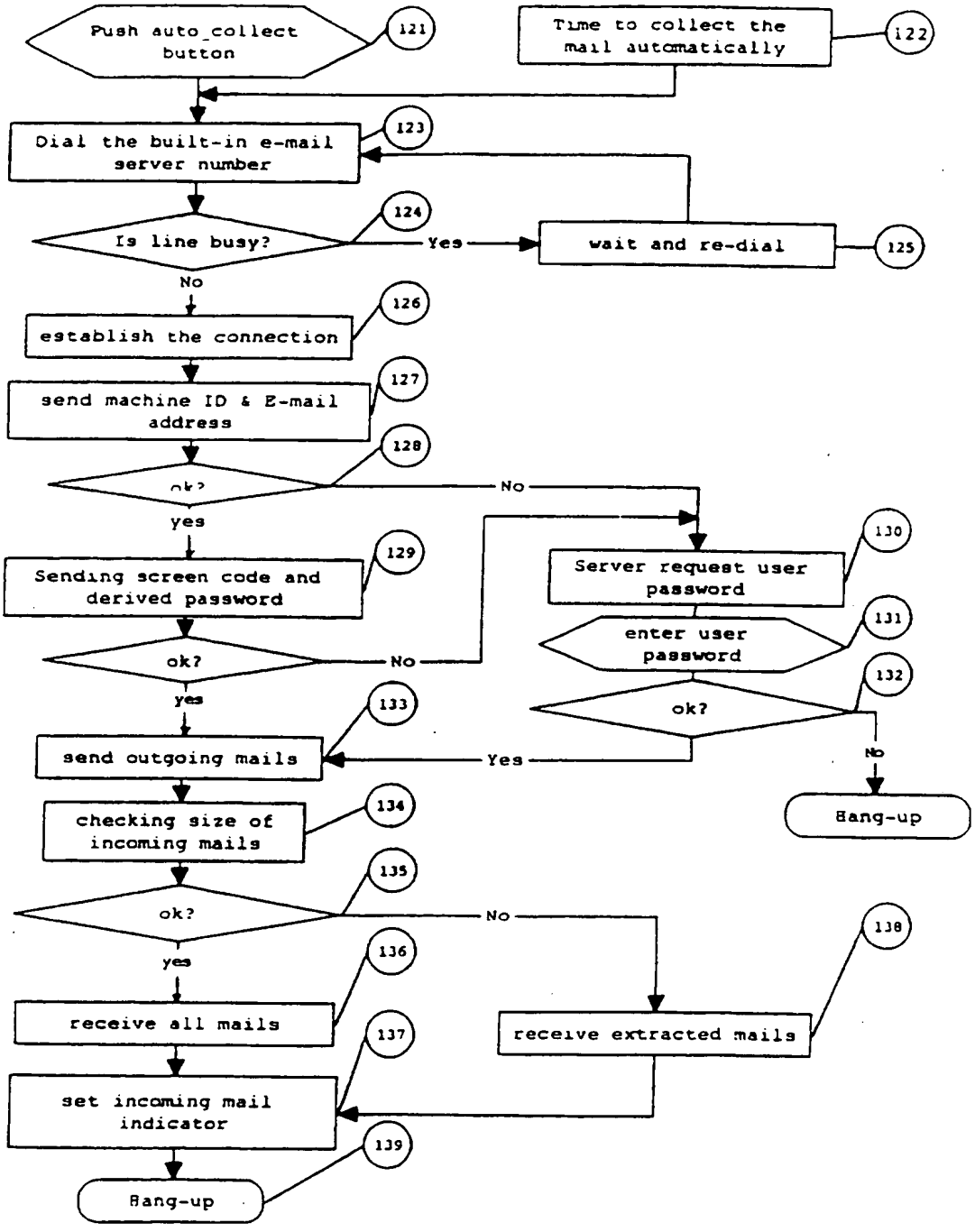


Figure 7: E-mail collect flow

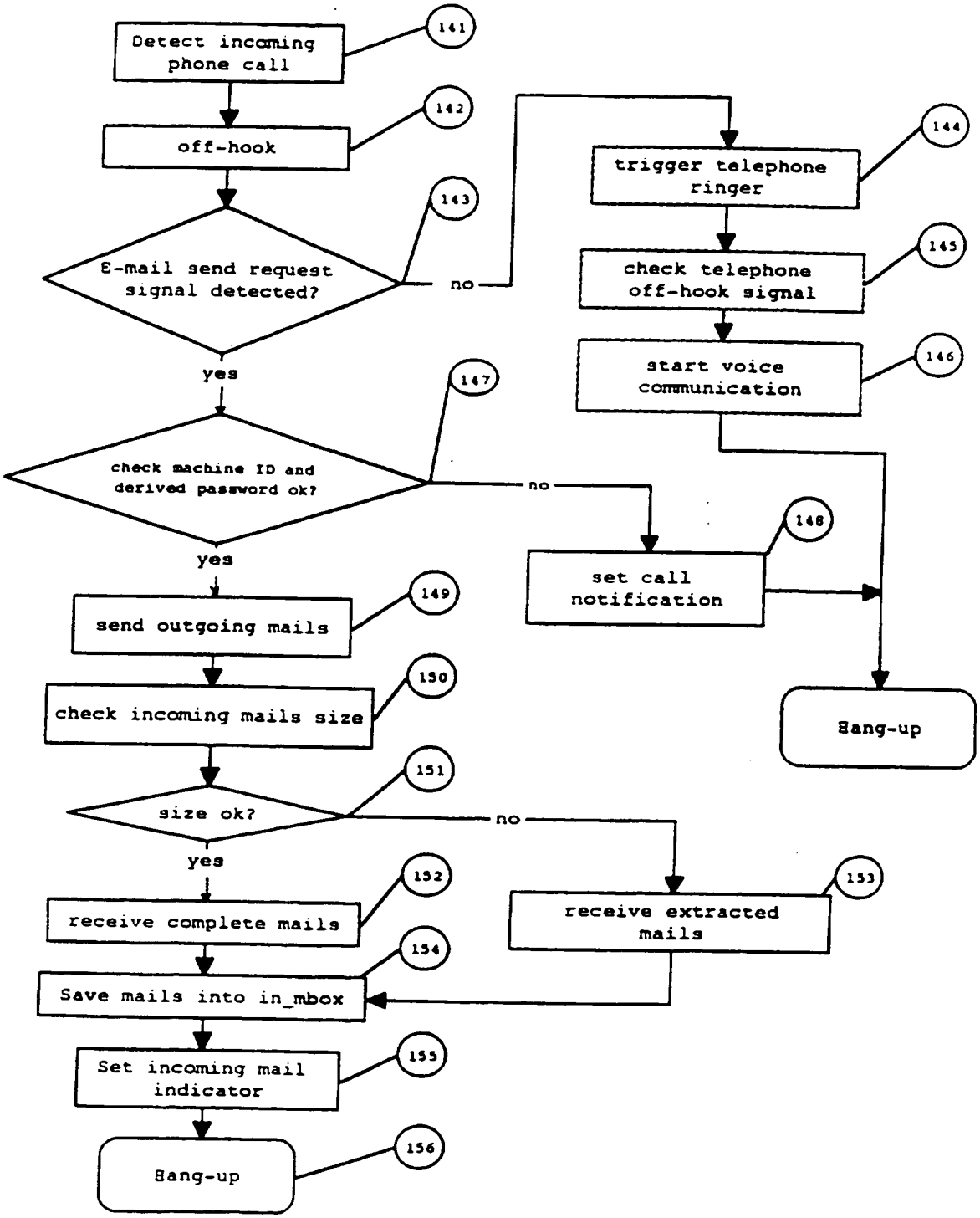


Figure 8: Apparatus's response to E-mail server

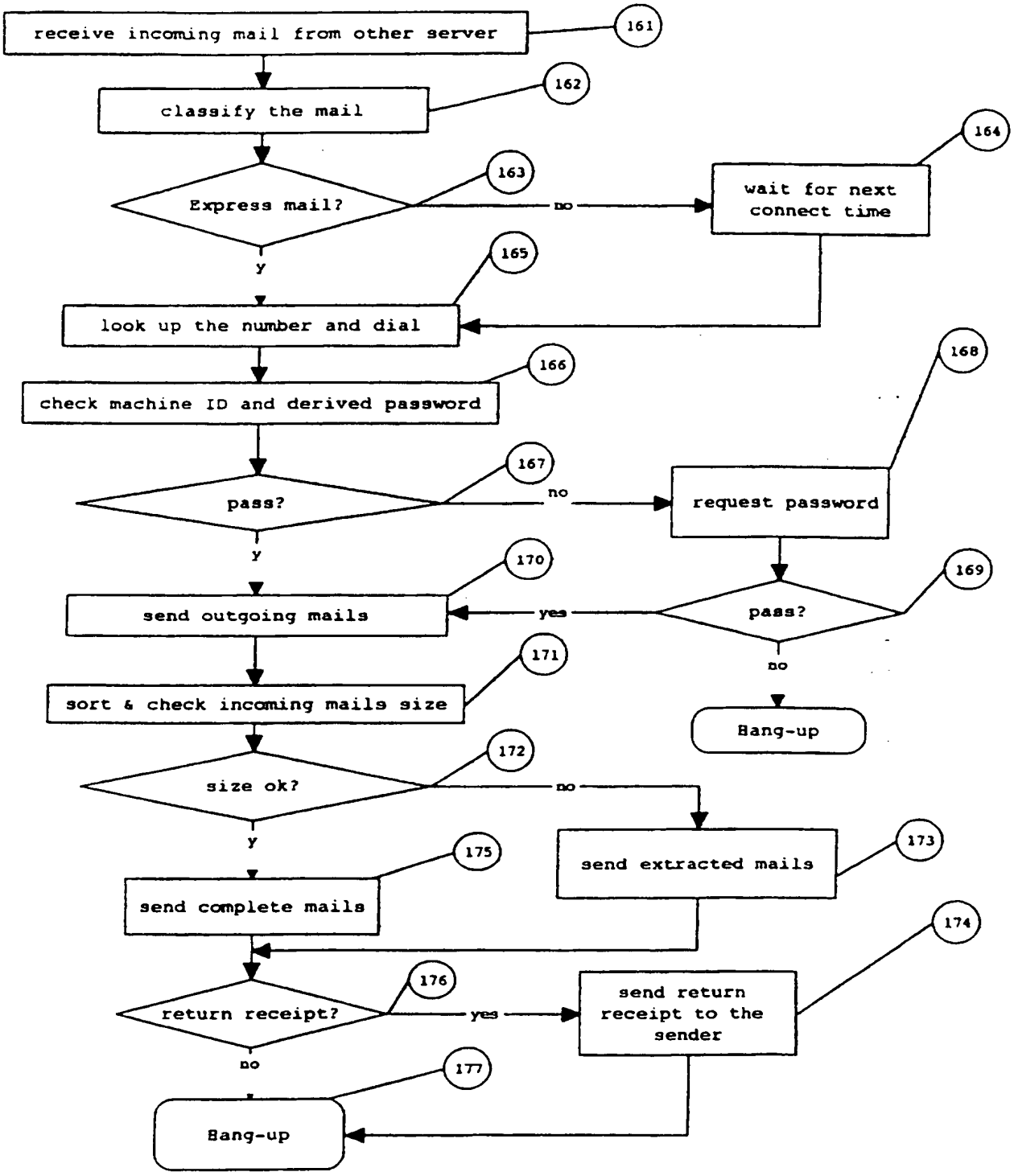


Figure 9:E-mail server mail process flow

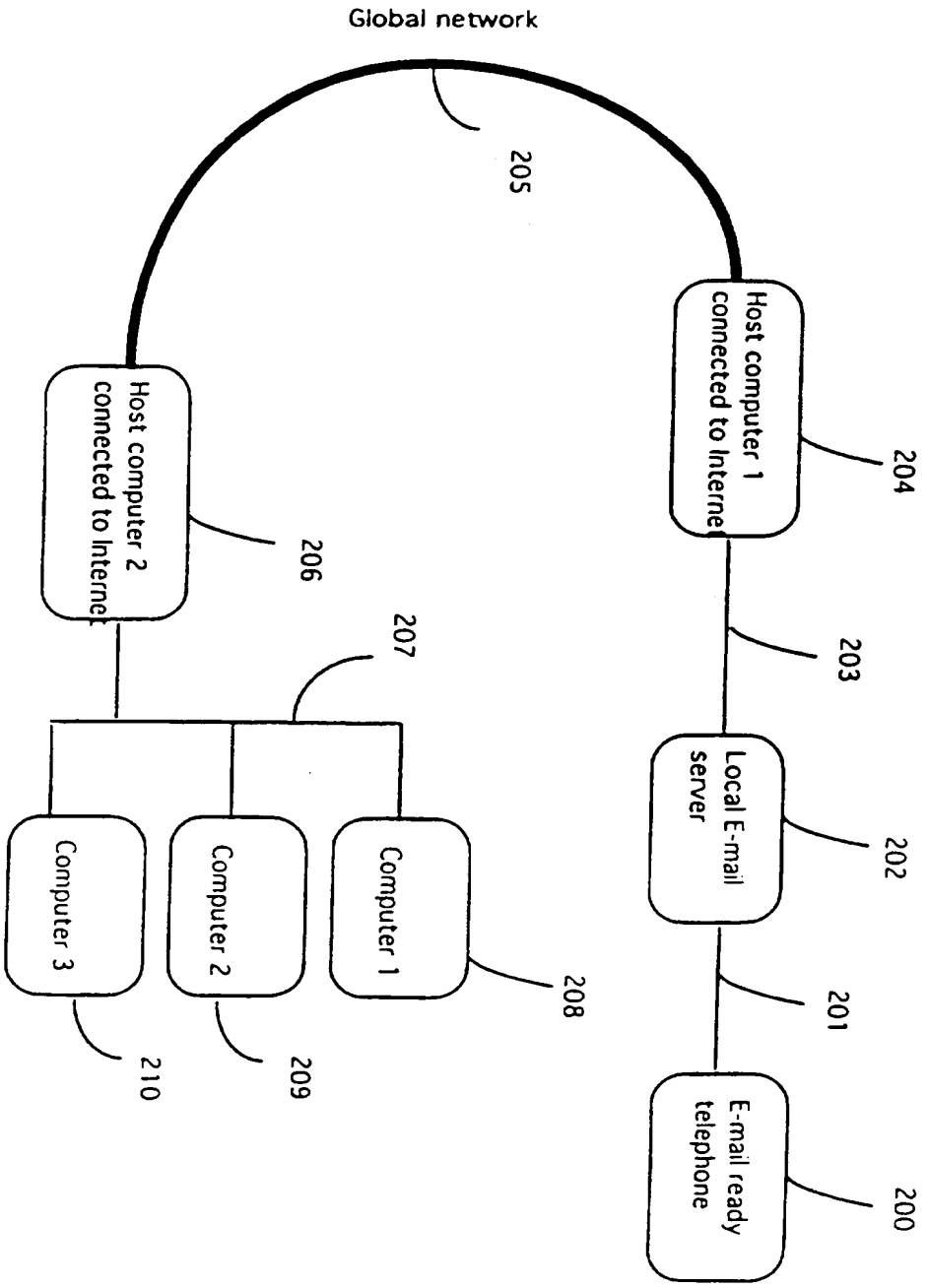


Fig. 10 Network connection diagram

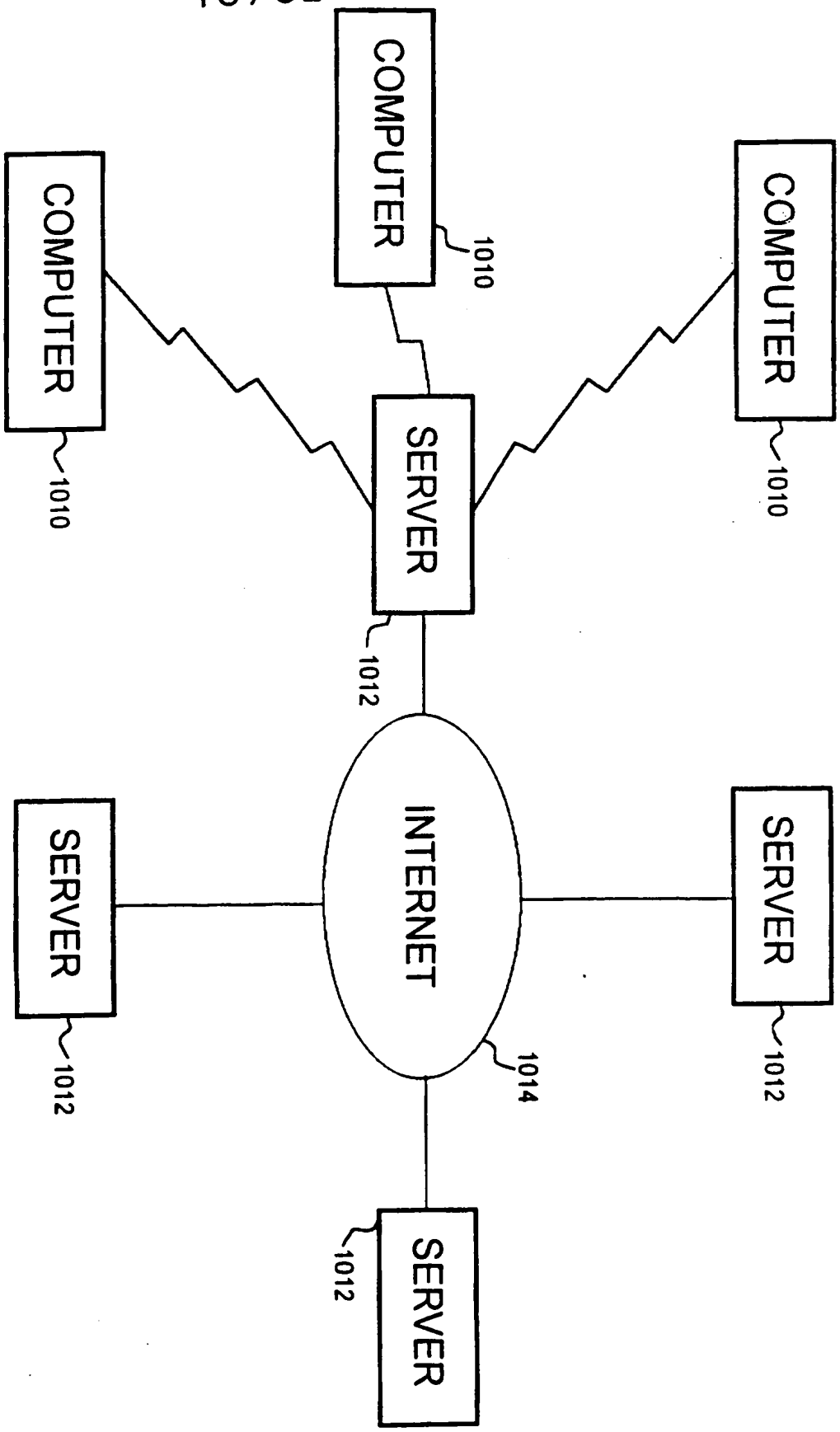


Fig. 11

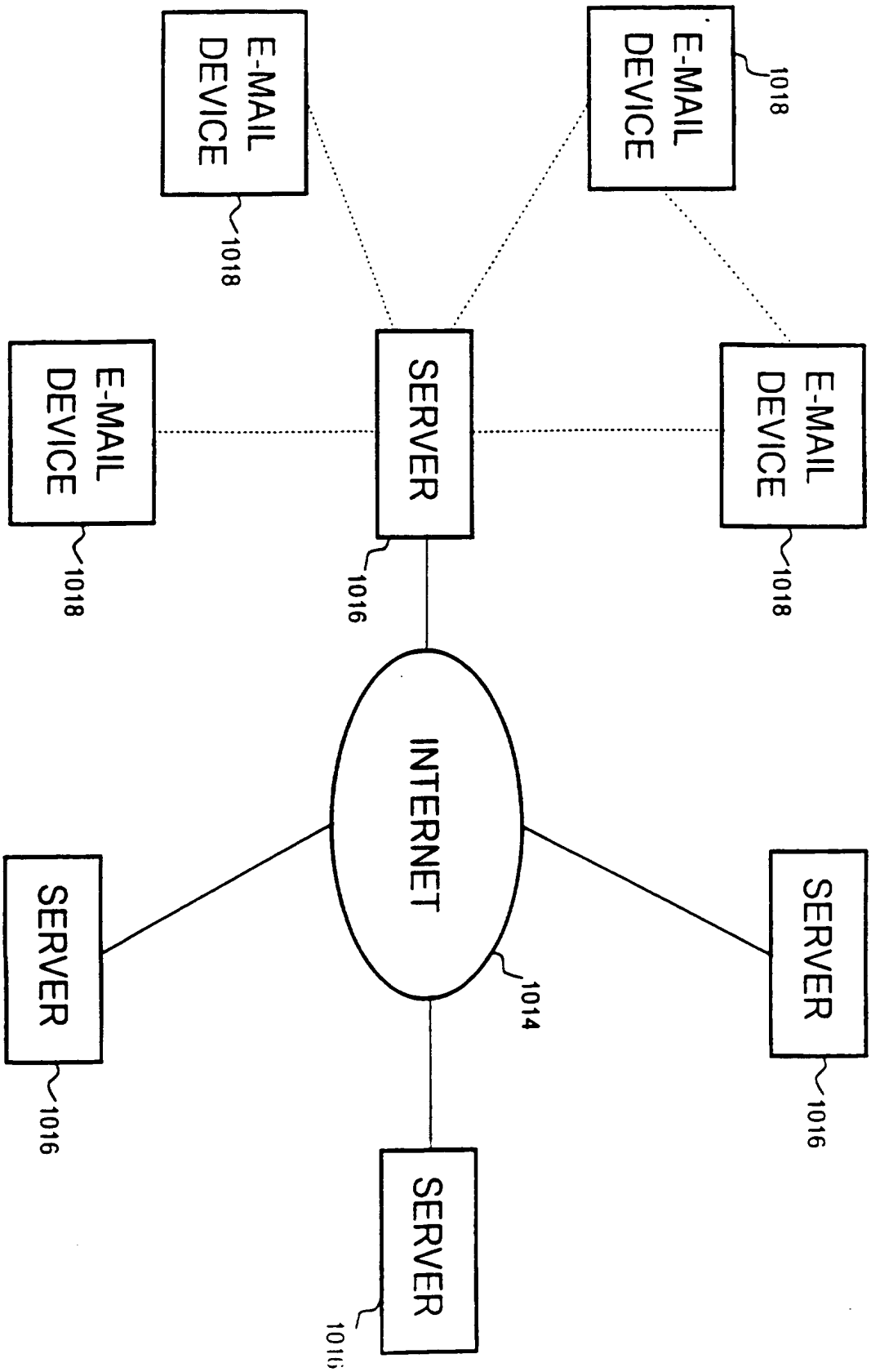


Fig. 12

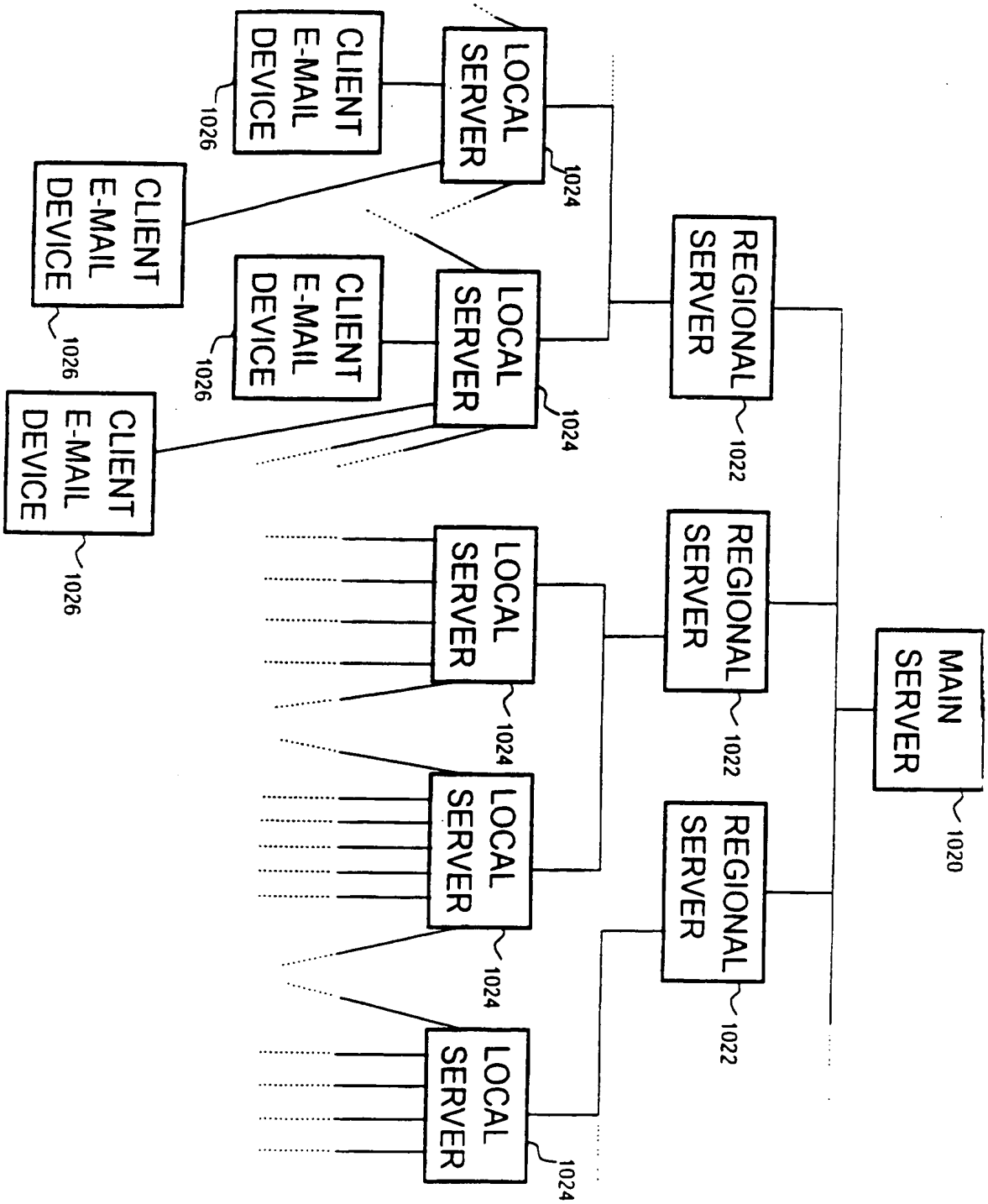


Fig. 13

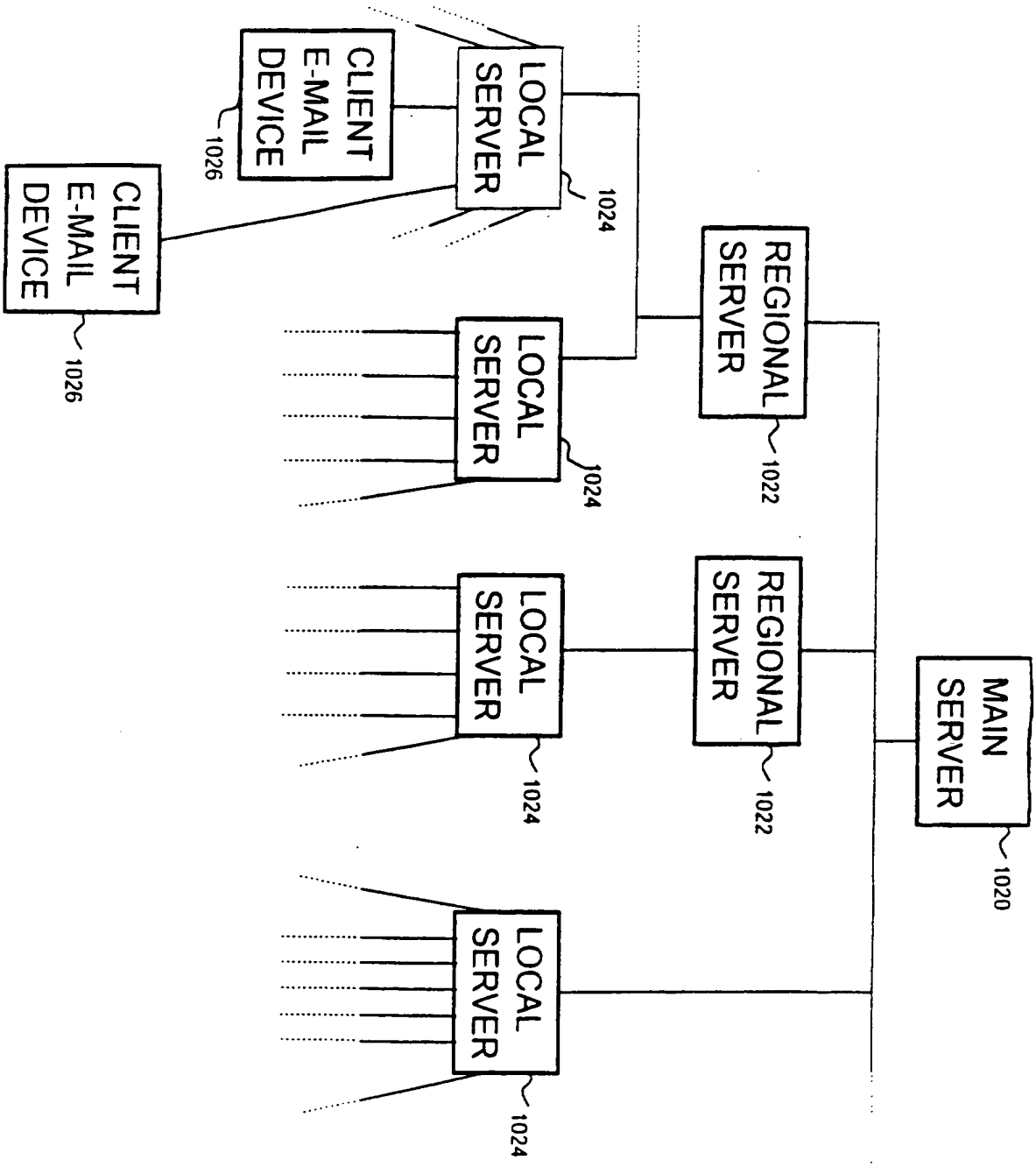


Fig. 14

Fig. 15

```
Registration Process:
    get machine ID
    get security code
    get notification code from e-mail device
    get phone number for e-mail device
    search for the phone number of the
        corresponding local server
    send local server phone number to
        e-mail device
    update tables for this client
```

Fig. 16a

```
Main_Mail_Process:
    Every x minutes
        Process_Incoming_Mail
        Process_Outgoing_Mail
```

Fig. 16b

```
Process_Outgoing_Mail:
    check for new outgoing mail every y minute
    if new outgoing mail found,
        for each outgoing mailbag
            decompress mailbag
            extract outgoing mail messages
            pass out outgoing messages
                to send mail utility
```

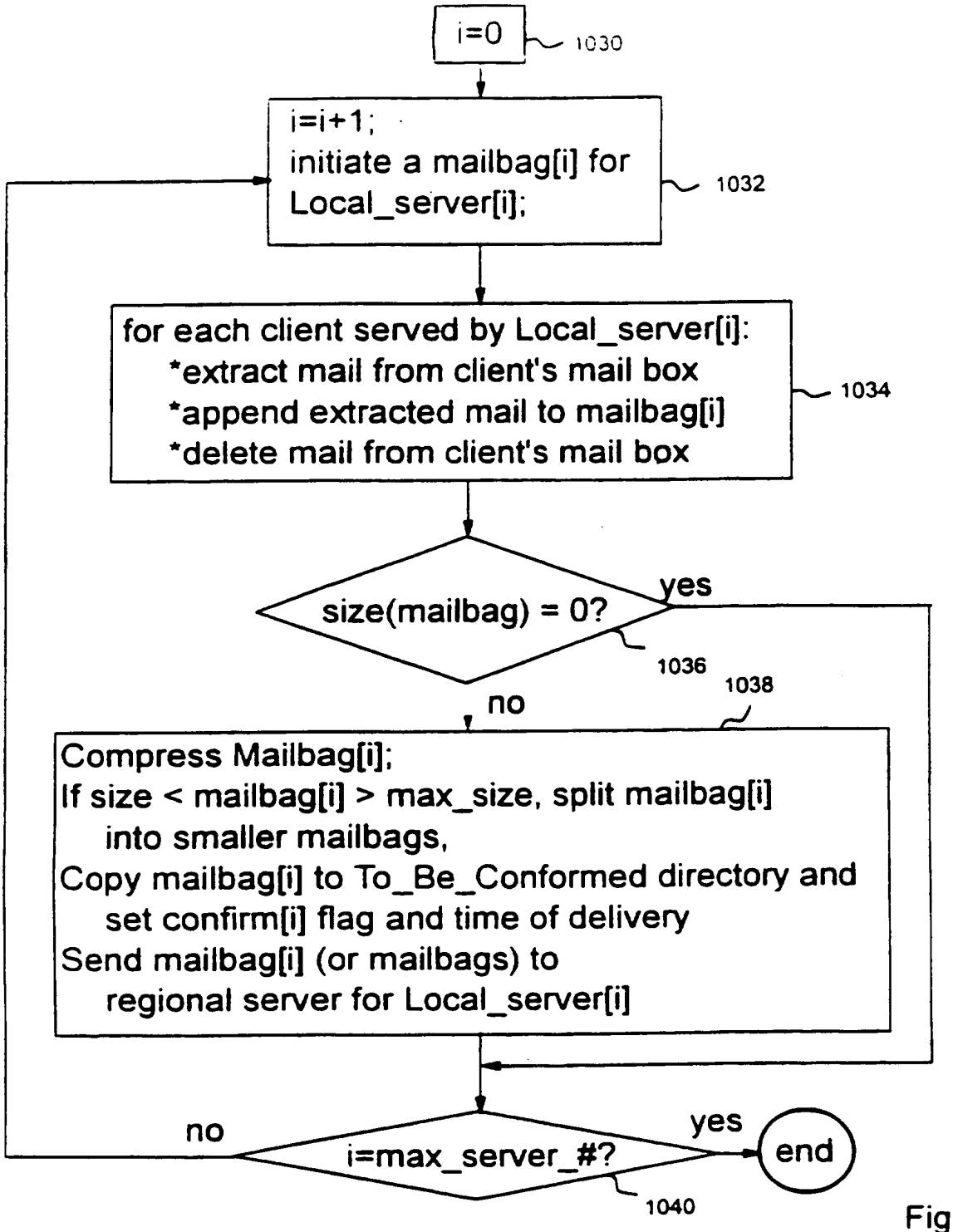


Fig. 16c

```
Confirm_process:
Every w minutes
    for each confirm[i]=true
        search confirmation mail message from local server[i];
        if confirmation found
            if not all mail message in mailbag[i]
                are delivered
                if elapsed time > max_elapse_time,
                    extract and place undelivered
                        mail message in delivery_failed
                        directory;
                    notify operator;
        if confirmation not found and
            elapse time > max_elapse time;
                notify operator;
```

Fig. 16d

Fig. 17a

```
Every x minutes
    get mailbag from regional server
    decompress mailbag
    extract mail message from mailbag
    identify & place mail into recipient clients'
        m_box
```

Fig. 17b

```
Every x minutes
    For each client[i]
    if client[i], m_box is not empty
        case(notification method):
            notify_only:
                notify_process;
            call_back_mail_delivery:
                call_back_mail_delivery;
            direct_mail_delivery:
                direct_mail_delivery;
            end
```

Fig. 17c

```
Notify_process:
    get last_logon_time of client[i]
    check_new_mail for client[i]
    if no new mail, or if notification has been sent already, exit;
    else
label1: call (client[i] phone number)
        if busy; wait x minutes and goto label 1;
    detect_ring_tone for client[i]. x1 second & disconnect;
    wait w1 second;
    call (client[i] phone number); if busy; wait x minute and goto label 1;
    detect_ring_tone for client[i]. x2 second & disconnect;
    wait w2 second;
    call (client[i] phone number); if busy; wait x minute and goto label 1;
    detect_ring_tone for client[i]. x3 second & disconnect;
```

Fig. 17d

```
Call_Back_Mail_Delivery:
    try_counter=0;
label 2: Notify_Process;
    Set AutoAnswer for x period of time
    If client calls back within x period of time
        Begin
            Handshake;
            Exchange_Mail_File;
            Disconnect;
            Send_Confirmation To_Server;
            Send_Outgoing_Mail To_Server;
        end
    Else
        If try_counter > max_try
            Report error to server
        Else increment try_counter
            goto label 2
    end
```

Fig. 17e

```
Direct_Mail_Delivery:
    Try_counter=0
label 3: Call Client
    If no reponse from E-mail device
        increment try_counter
        If try_counter > max_try
            report error to server
        Else
            goto label 3
        end
    Else
        Handshake;
        Exchange_Mail_File;
        Disconnect;
        Send_Confirmation To_Server;
        Send_Outgoing_Mail To_Server;
    end
```

Fig. 17f

```
Handshaking:
    Check security code
    If security code incorrect
        disconnect;
        report unmatched security code to server
    Else
        Check machine ID
        If machine ID incorrect
            disconnect;
            report unmatched machine ID to server;
        end
```

Fig. 17g

```
Exchange_Mail_FIles:
    Retrieve outgoing mail from client e-mail device;
    Get available storage size on e-mail device;
    If incoming mail message > available storage size
        Repackage_Mail_Messages;
    Send incoming mail to e-mail device;
    Disconnect;
```

Fig. 17h

```
Repackage_Mail_Messages:
    Sort incoming mail in order of priority
    Select mail in order of priority up to available storage
        size and leave space for a system mail message
        indicating more mail messgae at the local server
```

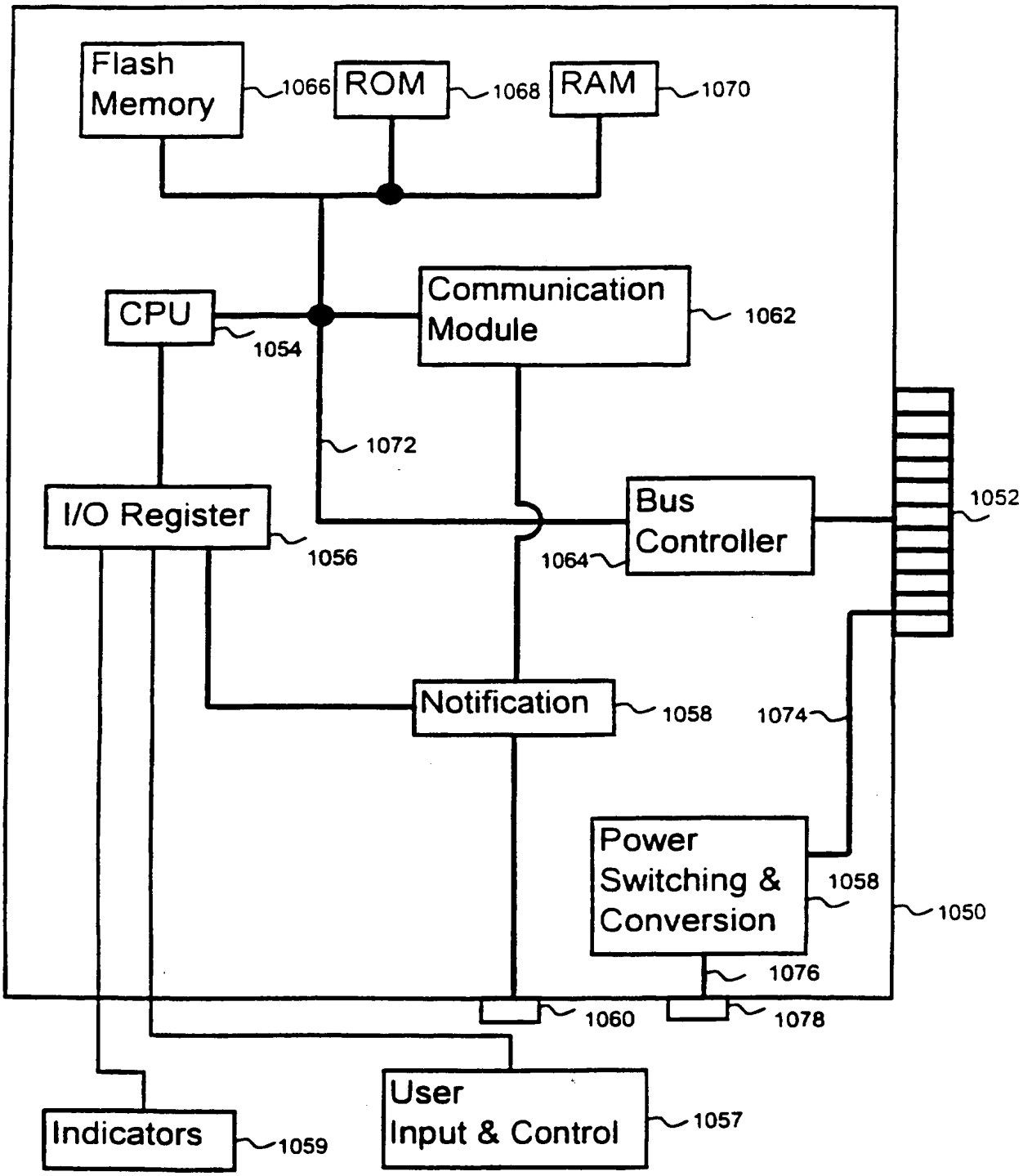


Fig. 18a

Fig. 18b

```
procedure Get_mail;
    check_card_status
    if busy wait                          // wait until it is not busy
    else
        begin
            check_inmail.
            if not empty move the mail to host
            empty the inbox on card
            display_mail
        end
```

Fig. 18c

```
procedure Send_mail;
    check_card_status
    if busy wait                          // wait until it is not busy
    else
        begin
            check_outmail_space
            if space available,  move the mail to card
            done
    end
```

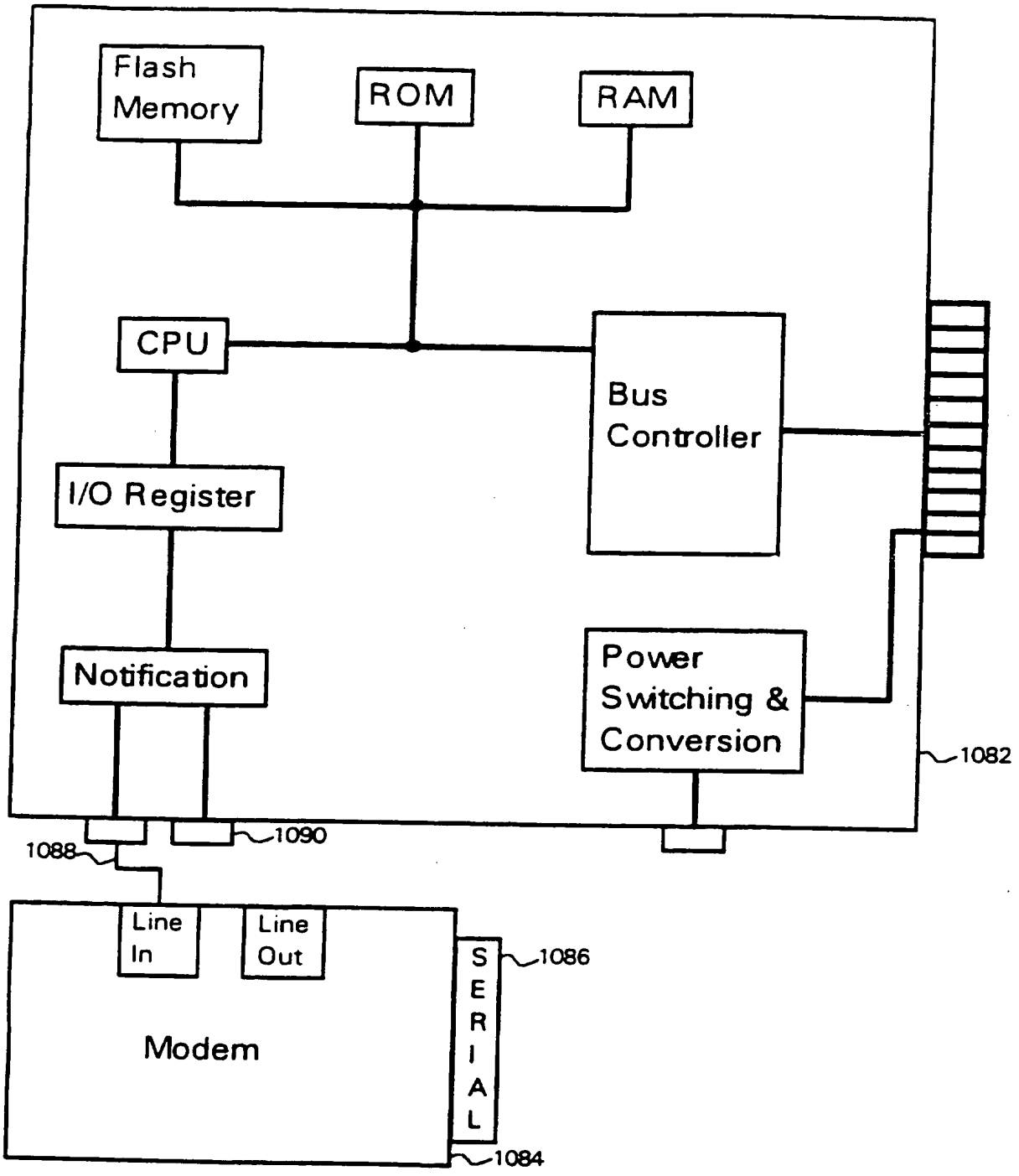


Fig. 19a

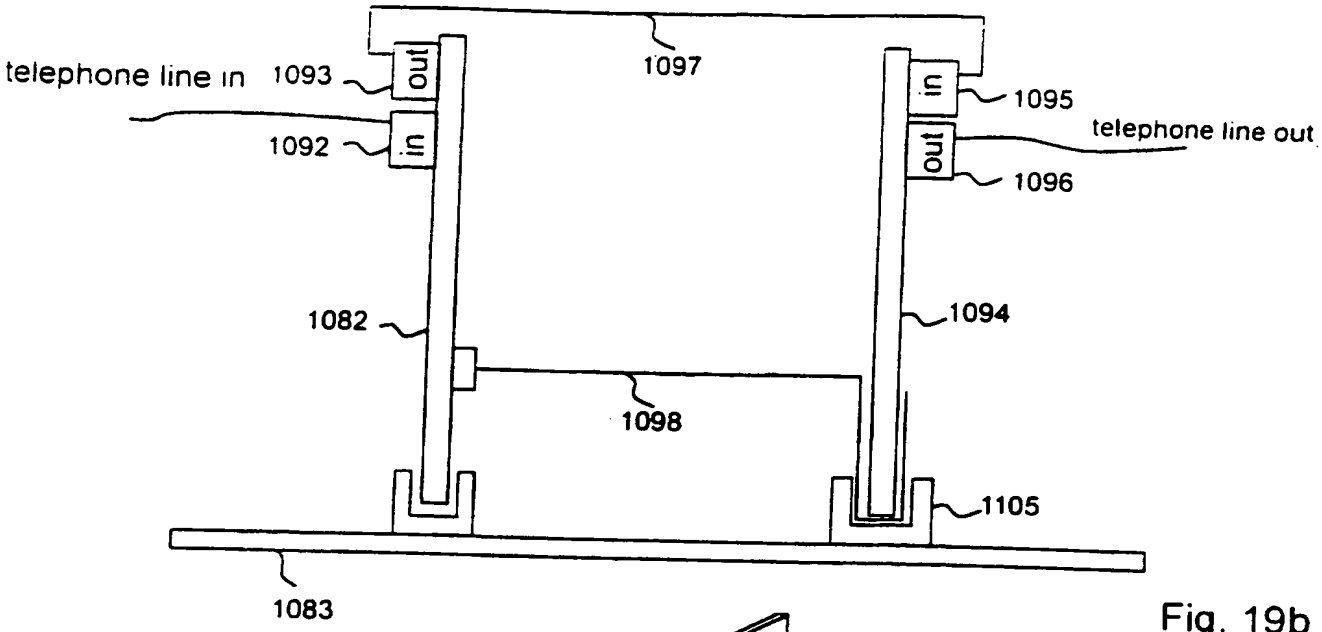


Fig. 19b

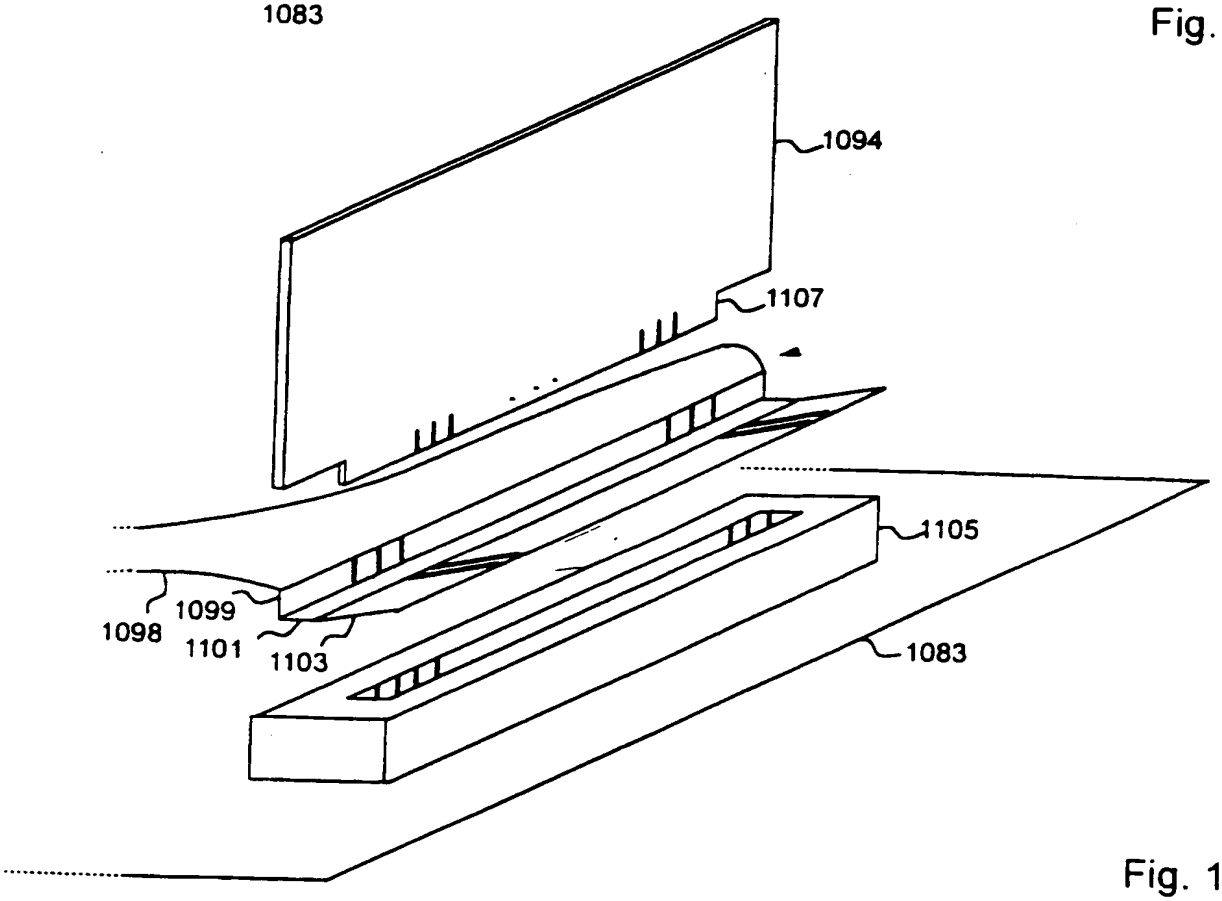


Fig. 19c

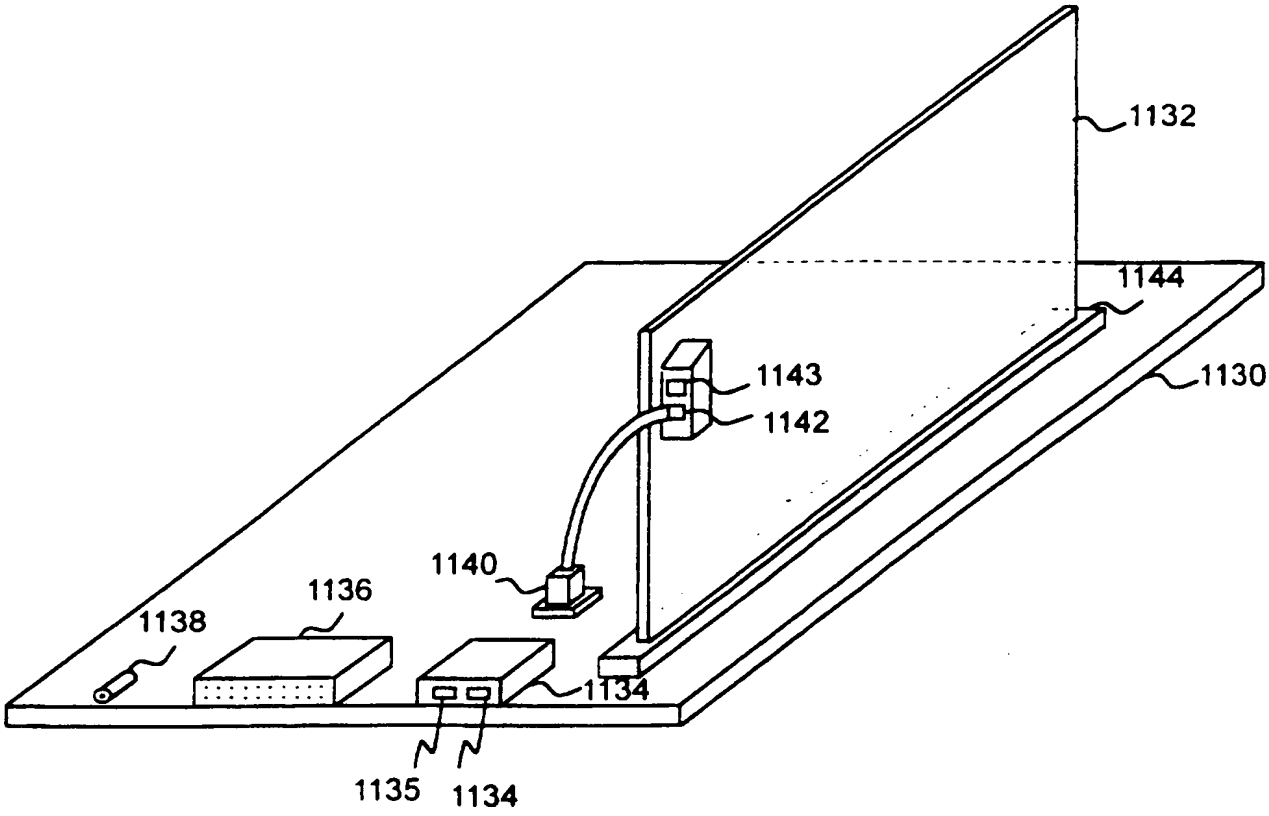


Fig. 19d

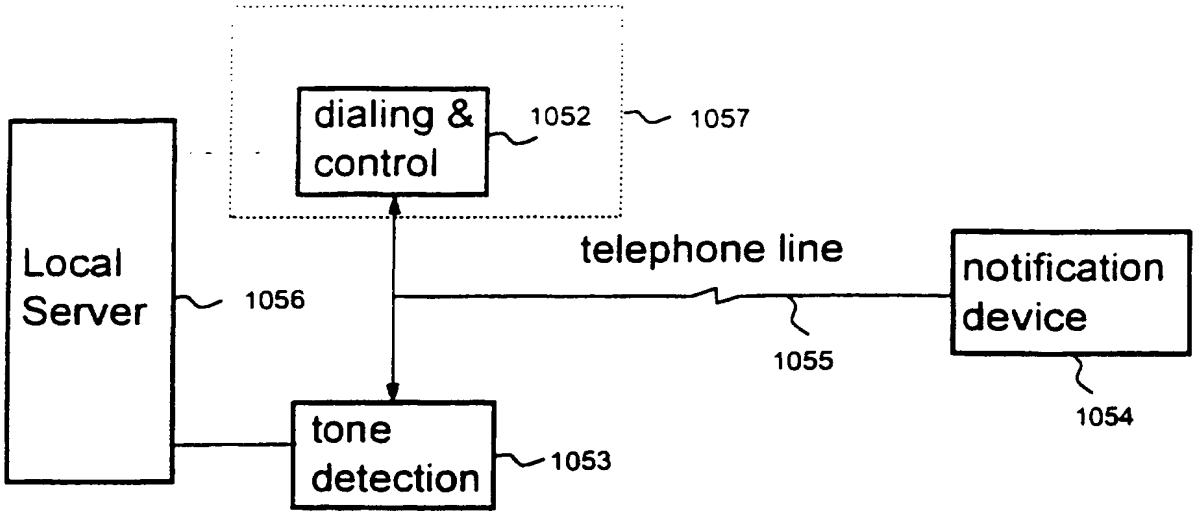


Fig. 20

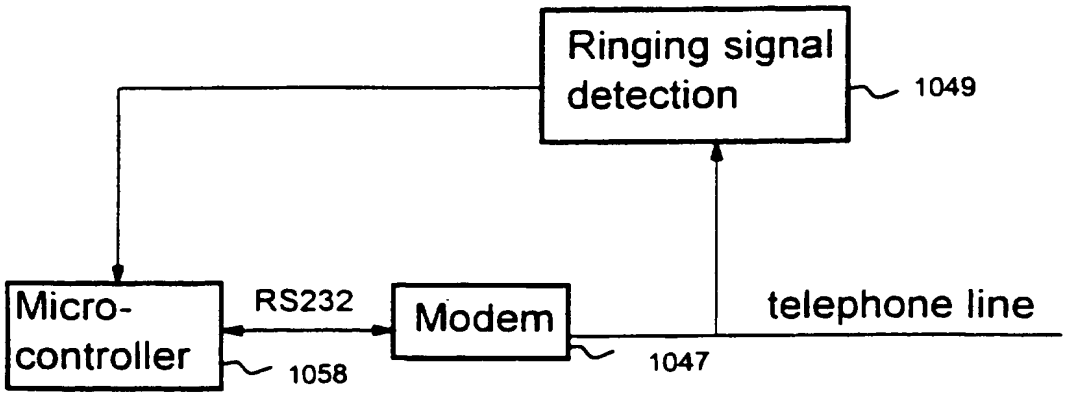


Fig. 21

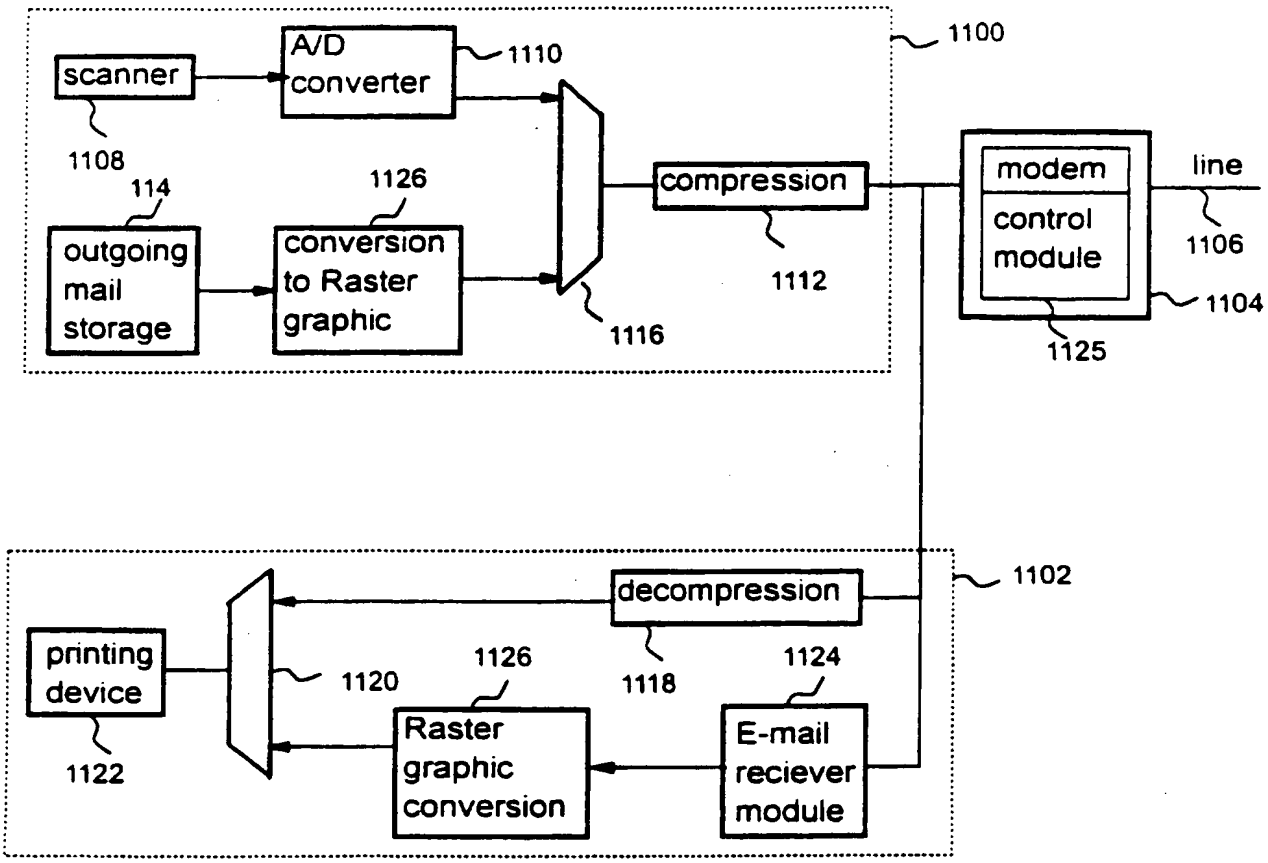


Fig. 22

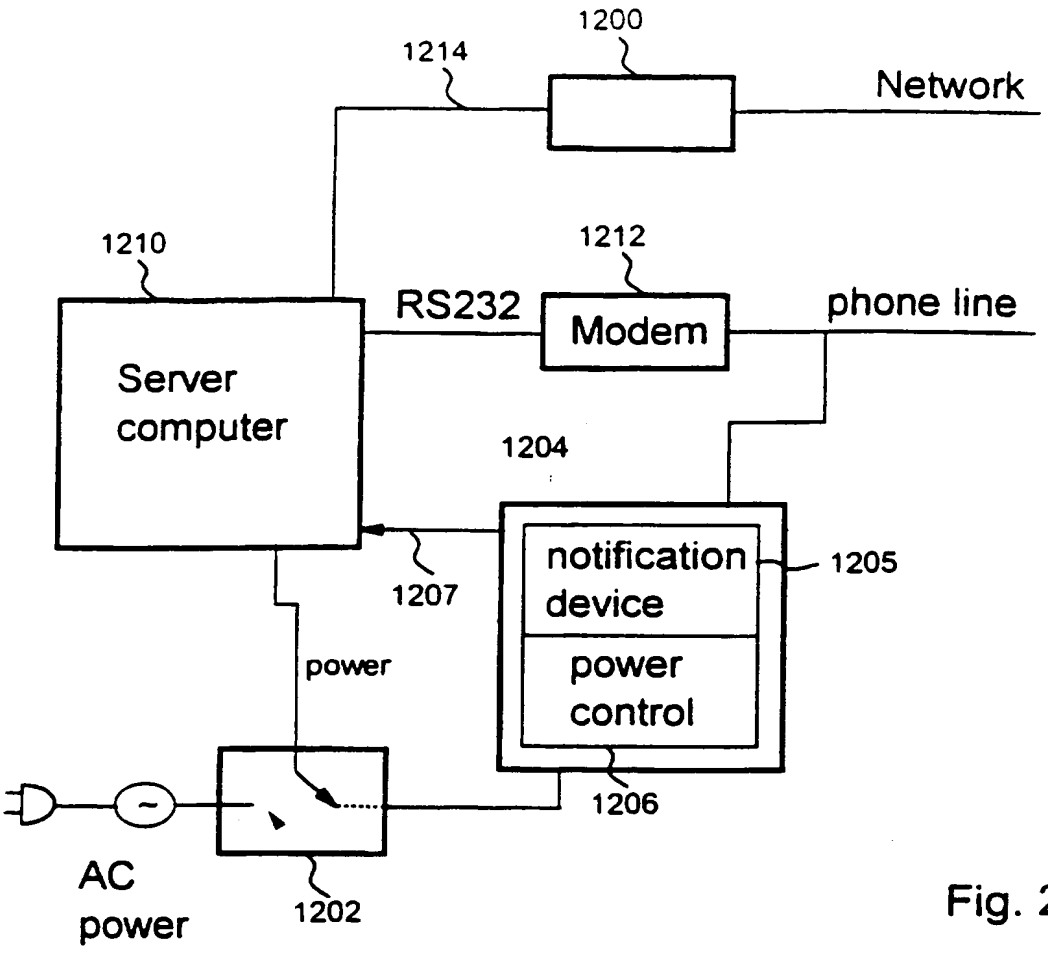


Fig. 23

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/11076

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04M 11/00
US CL :379/96

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/96,90,94,97-99,110,67,88,89,142. 348/6,7,14. 370/61.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US, A, 4,837,797 (FREENY, JR.) 06 June 1989, see abstract, all figures. | 1-27 |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

| | | | |
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| 23 AUGUST 1996 | 09 SEP 1996 |
| Name and mailing address of the ISA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231<br>Facsimile No. (703) 305-3230 | Authorized officer<br>WING F. CHAN<br>Telephone No. (703) 305-4750 |

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